your computer

MAY 1986 $2.95* NZ$3.50

MAKING YOUR MICRO WORK

DOUBLE BONUS: Beginners' BASIC Book Win a $13,000 Labtam

SUPER SHOOTOUT ISSUE!

Cheap and Blasty Games Machines

The Fastest AT Yet!

Registered by Australia Post — Publication No. NBP 4384 ISSN 0728-3931

MEMOREX

Disks

BRIGHT DISKS FOR
ANY COMPUTER

For More Information Call Memorex TOLL FREE 008-226117 or Sydney 908-2211 Melbourne 267-2955
New Zealand: Dataset Computer Supplies (N.Z.) Ltd. Auckland 795-561 Wellington 857-686

CONTENTS

NEW!! TOOLS FOR C PROGRAMMERS FROM HI-TECH SOFTWARE

HI—TECH C COMPILER

The HI—TECH C Compiler is an all-Australian high-performance C compiler for the Z80 and 8086/8088 processors.Now in use at thousands of sites in Australia and overseas, it combines an excellent user interface and diagnostic messages with smaller, faster generated code than any other compiler. It runs on CP/M-80, PC-DOS, MS-DOS, CP/M-86 and Concurrent CP/M. It allows for the generation of ROM based code and comes with a macro assembler, linker and librarian. The 8086 compiler supports large and small memory models and the 8087 maths co-processor. A cross compiler running under MS-DOS and producing code for the Z80 is also available.

Prices

8086 Compiler for MS-DOS or CP/M-86	$300.00
Z80 Compiler for CP/M-80	$250.00
Z80 Cross compiler for MS-DOS	$300.00

SNAKE

SNAKE is a utility for MS-DOS functionally equivalent to the Unix MAKE command. It automates the recompilation of any modified modules of a programme. This is an indispensible tool for any serious programmer using C or any other compiled language.

Prices

SNAKE	$89.00
SNAKE + BTree + ISAM	$249.00

BTREE & ISAM

BTree is a b-tree based index and data file manager supplied in C source code form. ISAM is a higher level set of routines providing powerful database management, also in C source form. ISAM requires BTree.

Prices

BTree	$119.00
BTree + ISAM	$179.00

A BOOK ON C

"A Book on C" by Al Kelley and Ira Pohl is an indispensable guide for every C programmer, whether a beginner or an experienced professional. An excellent introduction and a comprehensive reference to the C language, it has many examples and working programs.

Price: $32.95

MACRO ASSEMBLERS

HI-TECH Software has macro assemblers to run under MS-DOS or CP/M for the following micros: 8080, 8085, 8086, 80186, Z80, NSC800, 6800, 6801, 6805, 6809, 6301, 6303, and 64180. All use standard manufactures mnemonics and come with a powerful linker librarian and object code convertor. The assemblers produce absolute or relocatable code and Intel and Motorola Hex formats are supported.

Prices: $250.00

FUJI FLOPPY DISKS

We use only top quality Fuji floppy disks for our software. These disks are second to none in quality and carry a lifetime replacement warranty. Due to our high volume buying we can offer them to you at big savings. Some examples: (per box of 10).

5¼" DSDD	$42.00	5¼" SSDD	$31.00
3.5" SSDD	$67.50	3.5" DSDD	$87.50

DELIVERY CHARGES (via TNT Air)

Software	$8.00
Books	$6.00
Floppy Disks	$6.00

Only one delivery charge is payable per order, e.g. if you order software and floppy disks you pay only $8.00 for the whole order.

PHONE YOUR MASTERCARD, VISA OR BANKCARD ORDER TODAY ON (07) 38 3852 or write to:

HI-TECH SOFTWARE

P.O. BOX 103, ALDERLEY, QLD, 4051.
11 PAVONIA ST., ASHGROVE, QLD., 4060
Ph. (07) 38 3852
Call our 24hr 300bps Bulletin Board on (07) 38 6872

EDITOR
Natalie Filatoff
CONSULTING EDITOR
Les Bell
PRODUCTION EDITOR
Jane Mackenzie
ART & DESIGN
Greg Norrell
MANAGING EDITOR
Matt Whelan
PUBLISHER
Michael Hannan
CONTRIBUTORS
Australia: Brendan Akhurst, Ian Allen, Bill Bolton, Darren Challis, Phil Grouse, Tim Hartnell, John Hepworth, Frank Lee, Bruce Mitchell, John Nicholls, Jeff Richards, Ewart Stronach, Dom Swinkels, Colin Tringham.
United States: Howard Karten
OFFICE SERVICES
Felicity Skinner
SUBSCRIPTION ENQUIRIES
Julie Plummer
ADVERTISING SALES
Damien Prins (Advertising Manager), Andrea Beaty (Marketing Manager) and Craig Rowe (NSW Sales); David Farrington (Victorian Sales)
ADVERTISING PRODUCTION
Wayne Hanley
OFFICES
NSW
140 Joynton Ave, Waterloo 2017; (02) 663-9999.
Telex: FEDPUB AA74488
Victoria
150 Lonsdale St, Melbourne 3000; (03) 662-1222.
Telex: FEDPUB AA34340
Western Australia
Tony Allen and Ass. 7 Fore Street, Perth 6000; (09) 328 9833.
Telex: AA94382 POSPE
Queensland
Warren Tapner, Federal Publishing, 26 Chermside St, Newstead 4006; (07) 854 1119.
Telex AA145520.
South Australia
Dane Hanson, John Fairfax and Sons 101 Waymouth St, Adelaide 5000; (08) 212 1212.
Source Mail:
Les Bell TCY314
Matt Whelan TCY267.
Bulletin Board: (02) 662-1686
Les Bell 1085, Matt Whelan 1
or leave a message in comments.
YOUR COMPUTER
is published monthly by the Federal Publishing Company Pty Ltd.
Printed by ESN — The Litho Centre Waterloo 2017; (02) 662-8888.
Editorial and NSW Advertising:
140 Joynton Avenue,
Waterloo 2017.
Telex: FEDPUB AA74488.
Distributed nationally by Gordon & Gotch.
Registered for posting as a publication — Publication No. NBP4384. See 'Public Domain' section for information on copyright, contributions, reader services and subscriptions.
*Recommended and maximum price only.
ISSN 0725-3931.

EDITORIAL

If This Industry Would Just Slow Down . . .

A couple of days ago, at the PC '86 Conference in Sydney, I listened to John Sculley, President and CEO of Apple Computer, speak about Apple's plans for the Macintosh family, and in particular for an open architecture Mac which, in Sculley's words, will "do for the 68000 processor family what the IBM PC did for the Intel chip set".

This new top-end Mac, which will be released in 1987, will have plenty of expansion slots to accept LAN connection cards, graphics cards and other hardware interfaces, and will even support Unix. Looks like Apple is moving in yet another direction.

However, questioned at the end of his talk about industry stability, Sculley made an interesting and perceptive comment, and one which many locals would do well to consider.

Safi Qureshy, one of the three names behind AST Research, asked Sculley whether he thought the industry could sustain the 50 per cent growth rates many companies seem to need to survive. Sculley's reply was interesting: "I wish people in this industry would realise that if the industry would slow down its rate of growth, we could all make more money."

Claiming rapid growth rates made managing successful companies more difficult, Sculley argued that a well-managed and consistent growth rate of 20 per cent, rather than 50 per cent, would be more than satisfactory to him. Recent events continue to confirm this theory.

Remember Osborne Computer Corporation? Tremendous growth rates — virtually the highest in United States' industrial history — caused that company enormous problems: obtaining finance for growth, training new employees, implementing policies and procedures, creating a corporate culture. These things are all relatively easy to do at a relaxed growth rate, but well-nigh impossible when hanging onto the back of a galloping charger.

Just ask George Morrow. Morrow is one of the grand old men of the personal computer industry, having started his company in 1976 to supply add-on memory boards for the original Altair computer. Morrow Designs went on to supply enormously popular small CP/M systems, but the company always grew at a controlled pace.

A couple of years ago, though, Morrow realised the PC market was the one to be in, and set about creating a portable computer with IBM compatibility — the Pivot. Only now, much more capital was required to tool up for production, plus advertising, and more employees were required — and suddenly Morrow Designs was growing at a dramatic rate.

Coupled with a troubled relationship with Zenith, which was to manufacture and market the Pivot under licence, the growing pains were too much for the company, and just last week the doors closed at Morrow Designs — another victim of success.

Companies which grow slowly can achieve success more certainly. Look at Microbee Systems (formerly Applied Technology) here in Australia. Success (major success) has been a long time coming for Owen Hill and his team, but he was always working towards it. On the other hand the companies which float on the Stock Exchange with not much more than an idea for getting rich quickly undermine investor confidence in high-technology companies. The 'high-tech' tag is now a definite handicap on the market.

You can give me a 'get rich slow' scheme every time. □

LES BELL

THE MORROW LINGERS ON . . .

The recent demise of Morrow Designs makes quite spicy reading — rumours of intrigue, a new company springing up from nowhere . . . but computer buffs will still mourn the passing of a company with Morrow's reputation for quality.

A LONG TIME AGO in a valley far, far away . . . well, California in the mid-1970s, anyway . . . George Morrow started his company, specialising at that stage in CP/M machines, S100 boards and disk systems. In 1982 he raised $5 million worth of venture capital, moved to San Leandro near San Francisco, and started an expansion programme which many observers see as having led to the company's recent descent into Chapter 11 bankruptcy. Chapter 11 is intended to give a bankrupt company time to reorganise itself while protected from the wrath of its creditors, in the hope that it can pay off its debts and re-emerge still trading. In Morrow's case, however, with around $2.5 million owing to the Union Bank alone, this hope seems a little forlorn.

In its 10 or so years of trading, Morrow built up a reputation as a maker of quality 8-bit and 16-bit machines, with a high volume of international as well as United States sales; even some discerning Australian government departments purchased Morrow computers. Its latest development, the Pivot II, continued this high standard of both quality and acceptance — to such an extent, in fact, that Morrow entered into an agreement with Zenith Data Systems for that company to manufacture the Pivot under licence in order to increase the production rate, although technical design and development remained at Morrow.

Dealer sales both in the United States and overseas were good at this stage, but in an effort to increase the market for the Pivot, Morrow cut back on the dealer market in the US, going instead for corporate sales. This move might eventually have resulted in higher sales for the Pivot, but corporate sales deals take a long time to mature and Morrow was effectively left relying on overseas sales for cashflow.

Meanwhile, things started to happen on the Morrow/Zenith front. Morrow's chief executive officer, Bob Dilworth, who had been brought in to run the plant while the original laptop Pivot I was being developed, left last July to become CEO for Zenith.

George Morrow and his wife owned 51 per cent of Morrow, and insiders' versions of the story claim Zenith wanted them to sell. Around the same time, Zenith won a major contract with the United States Internal Revenue Service to supply a minimum of 15,000 of the Zenith laptop portable computer, the Z-171 — which is, in fact, the Pivot II under its licensed name. The Pivot was licensed to Sperry too, which also tendered for the IRS contract — and its machine was still to be manufactured by Morrow. So if Sperry had won the contract, Morrow might have avoided Chapter 11 . . . but the contract went to Zenith.

Finally, Morrow's cashflow dwindled enough for the company to lose its lines of credit with major suppliers and to be forced to lay off staff — the beginning of the company's death throes.

The Joker in the Pack

However, there was a last string to Morrow Designs' bow, albeit too late for George Morrow himself. An advanced version of the Pivot II had been developed by the Morrow engineering team: the Pivot II XT, which incorporated a 10 Mbyte hard disk and a new type of LCD screen. The Japanese-made 'Super Twist' display uses a new technology whereby liquid crystals turn 90 degrees to produce monochrome images ranging from dark black to clear. With an electro-luminescent panel to assist clarity, this screen is claimed to have the best resolution and definition of its type yet manufactured.

Neither the hard disk technology nor the screen had been licensed to Zenith, leaving it without an update path for the Pivot II. At this point, the Morrow engineering team stepped into the picture.

These engineers had been involved with the Pivot from the start, and Zenith still relied on them for technical advice. They basically had three choices at this stage, with Morrow about to submit to Chapter 11: get new jobs with other companies (easy for people with their reputation); suggest another company — such as Zenith — buy the rights to the Pivot II XT and take them along as the engineering team; or form their own company to manufacture the Pivot II XT. Under Howard Fulmer, Morrow's director of engineering, they decided on the latter course.

The engineers were able to raise venture capital for their new company, together with a financial adviser, a CEO with a good record in starting up new, small companies, and a commitment from a factory in Asia for an inventory of up to $3 million worth of finished stock and components. They hope the new company — to be called Pivot Corporation — will be officially incorporated on April 1, which they obviously feel is a suitable date.

The bank Morrow owes so much money to has, of course, the final say in whether this venture comes off. If the Pivot Corporation is established, the bank will collect a royalty on each Pivot produced, so it may well see this plan as the best alternative it can adopt — in fact, by the time you read this, it's expected this decision will have been confirmed.

Morrows in Australia

If you own a Morrow in Australia and read of Morrow's demise with a sinking heart, we have good news for you. Automation Statham, Morrow's distributor in Australia, assures *Your Computer* that it will become the Australasian distributor for the new Pivot Corporation, and guarantees it will not only service all Morrow machines in this country, but will also still be producing Morrow 8-bit Micro Decisions for some time. This service offer applies even if you didn't buy your machine through Automation Statham, although the question of warranties for machines bought from other sources will have to be sorted out individually.

Automation Statham also bought a large quantity of Morrow machines, terminals and parts before the bankruptcy decision, and hopes to be purchasing more when the company's assets are divided. You can contact Automation Statham on (02) 709 4144.

It's expected the Pivot II XT will begin production in the United States in late April or May, with deliveries to Australia starting around June; the price will be approximately $5700. A hard disk upgrade will also be available for the Pivot II portable, which will give it the capabilities of the Pivot II XT.

Zenith Still Going Strong

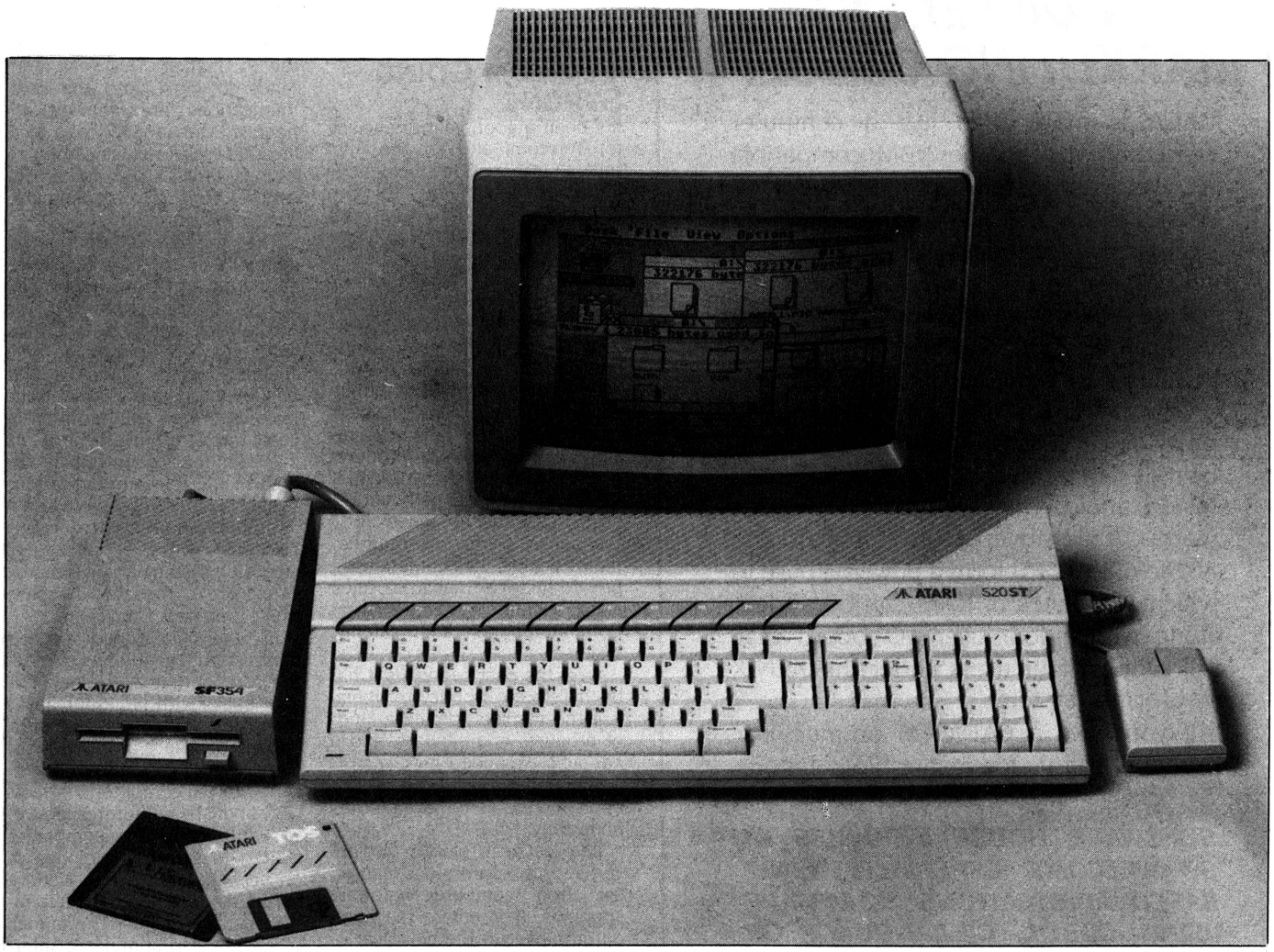
It looks now as if Zenith will be stuck without an upgrade path for the Pivot II, but it's quite possible the company might still try to obtain the rights to the hard disk and the screen. After all, it desperately needs this upgrade, being now arguably the world's largest supplier of laptop computers. We'll watch with interest . . .

Meanwhile, Zenith isn't standing still wringing its hands. In January it was selected by the Ford Motor Company in the United States to supply around 500 Z-171s, the machine having been named as Ford's 'corporate standard' for laptops. In February it acquired another huge US government contract to supply an estimated 90,000 Z-200 PCs to the air force, navy, army and marine corps, with the option for other Department of Defence agencies also to purchase the machines. And in March it signed an agreement with Computerland to sell the Z-171 through Computerland's stores, both in the United States and overseas.

Zenith's Australian distributor is Anitech, a division of ANI, one of Australia's largest corporations.

And the Man Himself . . .

If you're wondering, like us, what's happening to George Morrow in all this hoo-ha, we can't tell you. At the time of writing, no-one seemed to know how he was feeling about seeing 10 years of his life's work vanish down the corporate drain . . . □



MOBEX TAKES ON ATARI

You'll have heard by now of Jack Tramiel's latest *wunderkind* from Atari, the 520 ST, with its high-tech MC68000 processor and GEM (graphics environment manager) software that means the user never has look DOS in the face again unless he or she is feeling masochistic. GEM also allows features such as the use of a mouse, overlapping windows, drop-down menus and icons, and on top of this the 520 ST offers 520 Kbytes of RAM and 512 available colours for graphics.

In the United States and Europe the 520 ST has already sold well — helped along by its relatively low price — and was voted Best Hardware Value of 1985 by *Infoworld* magazine in the United States, and Personal Computer of the Year in Europe by a group of leading magazines.

It's no wonder Mobex, the company that has had such success in Australia with the now ubiquitous Casio brand products, has jumped at the chance to distribute the 520 ST — and the rest of the Atari product range — in Australia. Since handling Casio, Mobex claims to have doubled its market share in calculators, achieved domination of the musical keyboards market, and set Casio watches well on the way to their sales target. It's convinced it can do the same for Atari through the 520 ST.

The 520 ST is largely the brainchild of Jack Tramiel, who shifted Atari's product emphasis from games machines to state-of-the-art technology after taking over the company in 1984. However, the Atari 2600 series of games machines will still be sold, along with the 64 Kbyte 800XL and the 128 Kbyte 130XE home computers.

Mobex will soon announce recommended retail prices for the 520 ST, which will be available with mono or colour monitors. □

CD ENCYCLOPAEDIA

CD (compact disc) ROM technology will be available for the first time on a retail level as the result of an agreement between Philips Subsystems and Peripherals (a subsidiary of North American Philips Corp) and Grolier Electronic Publishing. Philips will provide its CM 100 CD ROM drive and CM 155 controller card to read Grolier's *The Electronic Encyclopaedia*, and will manufacture and supply compact discs containing the entire 20-volume text of the *Academic American Encyclopaedia*.

The CD ROM drive with the encyclopaedia and software is designed to be used with the IBM PC, XT, AT and some compatibles, although interfaces to other computers are expected to be available later.

The CM 100 was the first CD ROM drive shipped in volume, and provides fast, virtually error-free access to up to 600 Mbytes of digitally encoded data on standard 120 mm compact discs. One single-sided compact disc can store the contents of more than 1200 floppies, while still providing an access time of only seconds. The information on the disc is accessed through a search/retrieval program developed by Activenture Corp.

Philips pioneered the CD ROM technology and has committed itself strongly in this market area, offering more than just provision of the actual hardware. For example, as part of this agreement, Philips will provide a 90-day warranty for the hardware and assist Grolier with distribution and service.

The *Electronic Encyclopaedia* package is already available in a small number of retail outlets; contact George Sprague on (02) 926 3333 for more details. □▶

TELECOM GOING STRONG

It's been a good year financially for Telecom, and for the Australian information technology industry in general. Telecom ranked second — to IBM, who else? — in Australia's Top 50 information technology companies (according to *Business Review Weekly*, February 21, 1986), with revenue of $646 million — *which doesn't include telephone call charges, rentals and installation charges*!

So where did the $646 million come from, if not from Telecom's basic operations? It was apparently pulled in from products and services such as PABXs, videotex (Viatel in particular — 10,000 subscribers signed up in the service's first six months), radio paging, teleconferencing, private network services, telex, small business systems such as Computerphone, and satellite services.

Over the past two years it has been Telecom's policy to liberalise the markets for these kinds of products and services, and it has also expanded its own role as a supplier in these areas. This approach seems to have paid off financially.

Late last year Telecom also advertised for "expressions of interest" from computer hardware suppliers. If it enters the computer market in the next year or so it stands a good chance of becoming Australia's leading information technology supplier within two or three years. So next time you pick up a phone and dial STD, wincing inwardly at what it's going to cost you, just remember how well Telecom's doing *without* your humble contribution to its revenues. □

GOOD YEAR FOR PC INDUSTRY

The information technology sector of Australian industry had one of its best years in 1985, with a growth rate of 35 per cent — extraordinarily high by international standards. Industry in general bought PCs in large numbers for the first time, boosting their sales to over 100,000, while Telecom's Viatel gave public data services a wider market.

Top of the heap — naturally — was IBM, with sales of $800 million and a 25 per cent share of the PC market. This year it intends to move into the communications area, having announced the adoption of a local area network for office communications. It will also begin to distribute Rolm telecommunications products here.

The communications market generally is expected to experience good growth, with the inclusion of American giant AT&T in Australia's Top 50 information technology companies a sure sign of things to come. AT&T has only been operating in Australia for a few years, selling its products through Olivetti, but its main aim must be to gain a foothold in the telecommunications business here. Recently it won a $9 million contract to supply Telecom with a call-charge recording system, and we can be sure such a monster company won't look back from there.

In the mainframe sphere, banks started gearing up to meet the competition of the new foreign banks with large purchases of new hardware and software. Top retailers such as Woolworths and Myers committed themselves to big computer contracts ($35 and $10 million respectively), while many large companies started to spend lots of dollars on networks in order to achieve better management of their installed base of PCs. The launch of Aussat also stimulated interest in new possibilities for private telecommunications systems. □

BUT CAN IT ANSWER BACK?

The Kurzweil Voice System 3000 is claimed to be the world's first low-cost, commercial speech-recognition and response system, and was unveiled for the first time in this country by Software Corporation of Australia at PC '86.

The great thing about the KVS 3000 is that it operates with a variety of personal computers, mainly the IBM PC and compatibles. It is an external unit which attaches to the PC via the computer's RS232 serial port, and has been interfaced with Multimate, SCA's top word processing package.

Using the KVS 3000, the user will in theory be able to input all commands and some data entirely by voice. At present it has a ▶

SOFTERM PC

MICRO-TO-MAINFRAME CONCURRENT COMMUNICATIONS EXACT TERMINAL EMULATIONS

SOFTERM PC CONNECT YOU WITH MAINFRAMES.

Now you can access information services, bulletin boards, electronic mail systems, and even your company's computer from home or office. Softerm PC includes keyboard macros, a built-in phone book for automatic dialing simultaneous capture to print or disk, and much more. Softerm PC's extensive file transfer capabilities provide automatic execution using command files, support for popular protocols like XMODEM, and our own Softrans™ protocol which comes with an adaptable program for your host computer.

INTEGRATES COMMUNICATIONS WITH ANY PROGRAM.

Now you can add concurrent communications to all your favourite programs. Just load Softerm PC into your computer's memory so it will remain resident while you use other programs. Then, with a single keystroke, you can interrupt the current program and use Softerm to print or display files, dial a host computer, use terminal mode, or initiate a file transfer. You can return to the interrupted program and continue working while the other tasks are performed concurrently.

IBM is a registered trademark of IBM.

New Release 1986

MAKES YOUR IBM® PC WORK EXACTLY LIKE ANY MAJOR TERMINAL.

Softerm PC includes exact emulations of more than 30 popular terminals. All keyboard and display functions are provided for both conversational and block modes.

SOFTERM PC IS A COMMUNICATIONS BARGAIN.

Softerm PC is only

$399

TERMINAL EMULATIONS

TTY Compatible
ADDS Regent 20, 25, 40, 60
ADDS Viewpoint, Viewpoint/78
Data General D200, D410
Datapoint 3601, 8220*
Digital Equipment VT52, VT102, VT220
Hazeltine 1400, 1410, 1500, 1520
Hewlett Packard 2622A
Honeywell VIP 7205, 7801, 7803, 7813*
IBM 3101 Model 10 and 20
Lear Siegler ADM-2, ADM-3A, ADM-5
TeleVideo 910, 921, 925, 950
Texas Instruments Model 931*
TRS-80 Model 16 Console
User Defined
***Coming Soon**

Softerm is also available in versions for the NEC APC III, Tandy 1000/1200, Wang PC, TI Professional, DG1, Gridcase and Apple IIe & IIc, MacIntosh version coming soon.

- 1st QTR 1986 Additional Protocols including Kermit, Hayes, and Clink.
- Seamless integration provides a transparent, micro to mainframe link to any PC-DOS application.
  Assigns unused device specifiers such as H: and I: to represent remote systems.
- One shot from Dataview now included. Allows textfiles to be converted into 7 different formats including:- WKS, WRK, DIF, SYLK, ETC..

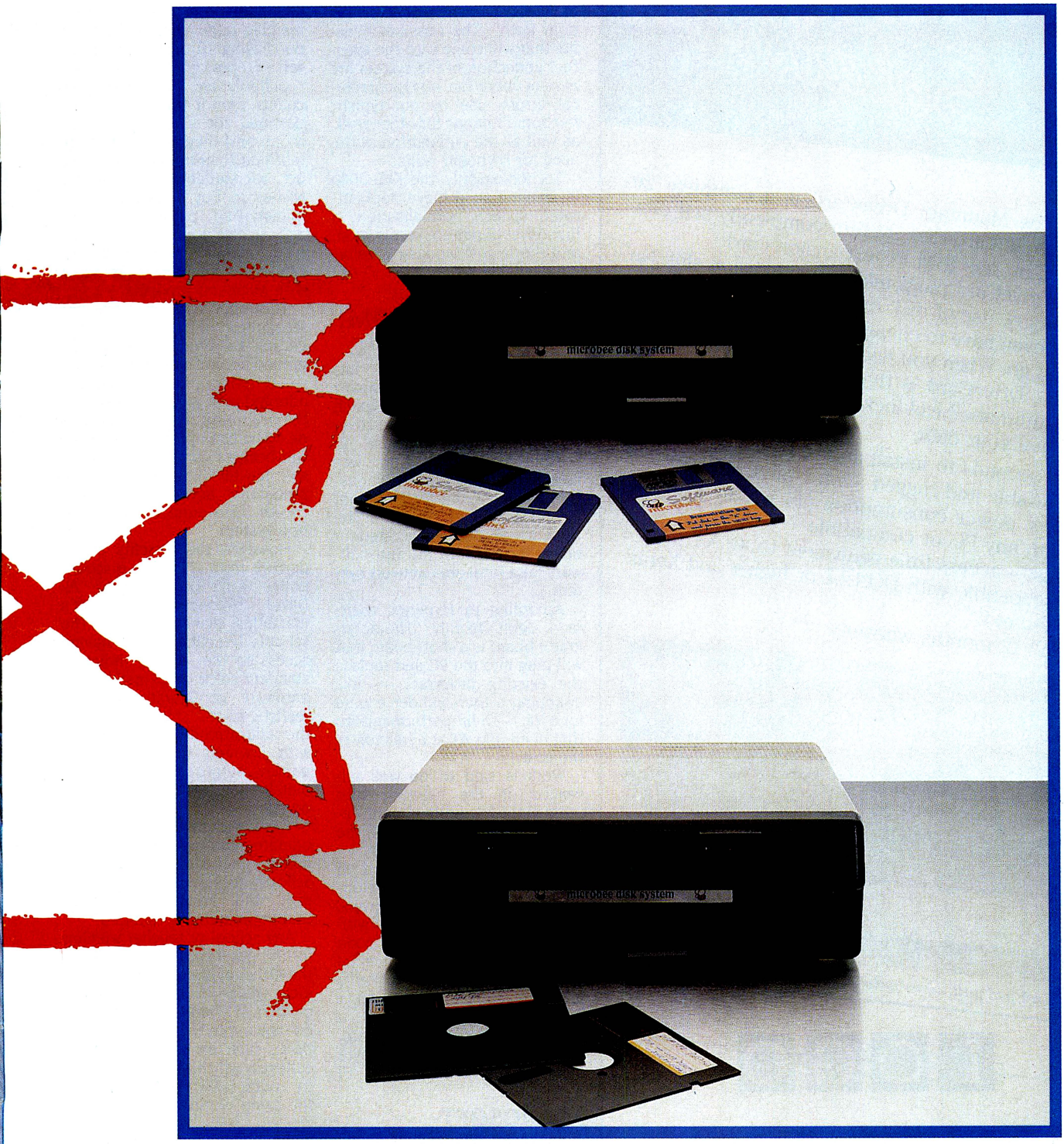
WORDCOMM

Suite 203, 156 Pacific Highway
St Leonards N.S.W.
Australia 2065
Telephone: (02) 439 7144, (02) 439 6312
Telex: AA 10713845

This goes with this, goes

As you can see, we've been busy. Microbee computers are now totally modular systems. Very simply, you can now mix and match the size of disk drive with either our 64K or 128K keyboard units. We've also developed a new 3.5 inch disk system, available with either single or twin drives. So now, if you want 3.5 inch drives you won't be forced to opt for the 64K System when you want a full 128K of memory. And if you want 5.25 inch drives but don't need 128K of memory, the 64K system will team with them perfectly. This gives microbee computers an even greater

with this, goes with this:



flexibility than ever before. Especially when you choose from Premium or Standard models and a full range of peripherals; monitors (amber, green or colour), Beemodem and printers. And if you think all these new systems are going to cost a lot more, then you don't know Microbee.

Microbee Systems Limited. Sydney (02) 888 9866, Melbourne (03) 817 1371, Queensland (07) 394 3688, South Australia (08) 212 3299, Western Australia (09) 386 8289, A.C.T. (062) 51 5883.

microbee computer

MCB 0006

vocabulary of only 1000 words for each application, but according to SCA's managing director, Arnold Roth, "The possible benefits that will come with the eventual perfection of the system are ease of operation, no typographical errors, use by non-typists, freedom of hands for other work, as well as the elimination of the need for keyboard skills."

Technologically, the KVS 3000 is claimed to achieve sophisticated speech normalisation, a high level of pattern recognition, and the largest working vocabulary available. □

EXTRA VRROOOM! FOR YOUR IBM PC

The Federal Government has awarded Sydney-based company Hypertec an $88,050 research grant (maybe the $50 is to cover the forthcoming increase in postal costs?). The grant was awarded by the Australian Industrial Research and Development Incentives Board, and will be used to develop an accelerator board for the IBM PC and software for a local area network system.

According to Hypertec chairman, Geoff O'Reilly, "The accelerator board is a short board that will plug into the PC and replace the existing processor — like swapping a four-cylinder engine for a V8 — to lift performance to that of an IBM AT at a fraction of the cost."

Work is said to be well advanced on the network, with most of the hardware already developed and the writing of the software nearing completion.

Hypertec was established in 1979 as a research and development company by David Evans, John Blair and Neville Clark, with the main aim of turning good technical ideas into commercial reality. Since Geoff O'Reilly joined the company a year ago, it has launched two products: a 1.75 Mbyte multi-function board, and a low-priced 256 Kbyte memory expansion board. □

MICROSOFT EMULATES APPLE

In a move to capture the education market, Microsoft has announced large discounts for Australian schools purchasing its products for use in the classroom. Schools buying one to nine units of any Microsoft product will receive 45 per cent discount off the current recommended retail price, while those purchasing 10 units or more receive 60 per cent discount.

Schools are eligible for discounts only if the products are destined for use in the classroom, or if they're to be used by teachers to introduce the product to students. If a school wishes to buy software for administration purposes, it will only receive a discount if it is already meeting at least 80 per cent of its administrative needs with Microsoft products.

This offer reflects Microsoft's recognition of the importance of getting its products in on the ground floor of a future user base — a policy that Apple has adopted with great success from the beginning. If a student learns on a Microsoft product, he or she will become comfortable with it, will master it, and will in all probability adopt it as a first choice once outside the education system.

However, the benefits to be derived from this new discount policy won't be one-sided. As David Svendsen, Microsoft's marketing manager, says, "The schools benefit through having access to the leading industry-standard software to match their hardware configurations, at a realistic price . . . No longer must the educationalist feel limited with low-end software that is quickly outgrown or does not match what the business world is doing."

The discount scheme will be operated through the Microsoft dealer network, to ensure schools receive maximum support and additional product training material if required.

Any school or teacher wishing to find out if they are eligible for the discount should contact their local dealer, or phone Microsoft on (02) 452 5088. The discounts do not apply to tertiary institutions, such as universities and colleges, which should continue to contact Microsoft direct on the same number for their purchases. □

EDUCATION AND TECHNOLOGY REPORT

The Australian Education Council's recently released report, ▶

Peace of mind in three sizes.

Now Fuji brings you excellence in floppy disks.

There's nothing more frustrating than having a disk go down when it is filled with valuable data. That was our understanding when we first started designing our floppy disks.

We decided to do it right!

The result is a range of products that is so reliable, it carries a lifetime warranty.

The excellence that is relied upon with our photographic products is now available in our range of highest quality disks. Ask for them by name.

SELECTED SUPPLIERS

N.S.W. SYDNEY: Contact Computer Supplies 419 4908 — A B Office Electronics 949 7195 — C A E Electronics 621 4242 — Calmar Distributors 698 1999 — The Computer Shop 517 2999 — Intelligence 699 3877 — Lamron 808 3666 — Logical Solutions 212 6655 — Manly Stationery Supplies 938 2522 — Mitsui Computer 451 7711 — Office World 439 8077 — Pre-Pack Electronics 569 9797 — R I O Distributing 399 9900 — Thinking Systems 560 0666 — Transcript 764 2177 — The Computer Stationery Co 635 1339 — **DUBBO:** Orana Cash Registers 825 833 — **WOLLONGONG:** Altech Electronics 84 3059 — Business & Leisure 29 9744 — **WAGGA:** Verlynne Computer Services 216 522 — **VIC. MELBOURNE:** Goodman Cannington 429 8011 — Output Media 544 4400 — Copy Source 429 9355 — Ray Cross Electronics 762 8566 — **BALLARAT:** Ballarat Image Supplies 35 7298 — **GEELONG:** Systems Stationery & Computing 22 2844 — **HAMILTON:** Sovereign Office Machines 72 2333 — **WARRNAMBOOL:** C J Computer Systems 62 8178 — **QLD. BRISBANE:** The Byte Shop 371 0711 — C W Electronics 397 0888 — Computer Paper Supplies 369 5277 — Design Offices Co-op 831 4977 — **CAIRNS:** Cairns Stationery Supplies 51 2277 — **MT. ISA:** Barkly Computer 43 2929 — **SOUTHPORT:** Stateside Gold Coast 32 8988 — **S.A. ADELAIDE:** Boss Business Products 233 2224 — Perce Burton Business Equipment 212 2611 — **MT. GAMBIER:** Southeast Business Machines 25 8900 — **W.A. PERTH:** Jays Business Equipment 381 8700 — Regional Computers 328 9062 — **BOULDER:** Computers West 21 6961 — **KARRATHA:** Dave's Oscitronic 85 4836 — **A.C.T. BELCONNEN:** Actcom Computer 51 4307 — **TAS. HOBART:** Southern Star Industries 72 9530 — **LAUNCESTON:** Computer Craft 31 8133

Trade Enquiries Fujimex a Division of HANIMEX (02) 938 0241

HMFD 1304

Education and Technology, is the first national publication to examine the interaction of education and technology. It was compiled by a task force of representatives appointed by Commonwealth, state and the Northern Territory governments, and contains 24 recommendations.

Mr Lynn Arnold (South Australian Minister for Technology and Minister for Employment and Further Education) said when he released the report, "These recommendations would form the basis for action by the AEC after community views have been canvassed.

"The report aims not only to act as a catalyst in the debate surrounding education and technology, but also to provide an impetus to policy development and action by education systems.

"Technology implies much more than the tools and technical inventions of a society. It involves the whole complex of skills, techniques and processes by which a group maintains production and applies knowledge.

"Technological change is a significant aspect of the major social and economic changes that are affecting all aspects of Australian life. Education is being challenged to respond; to provide the confidence and skill needed to benefit from what new technologies offer, while at the same time developing the understanding and commitment to protect those aspects of our lifestyle that are most valued."

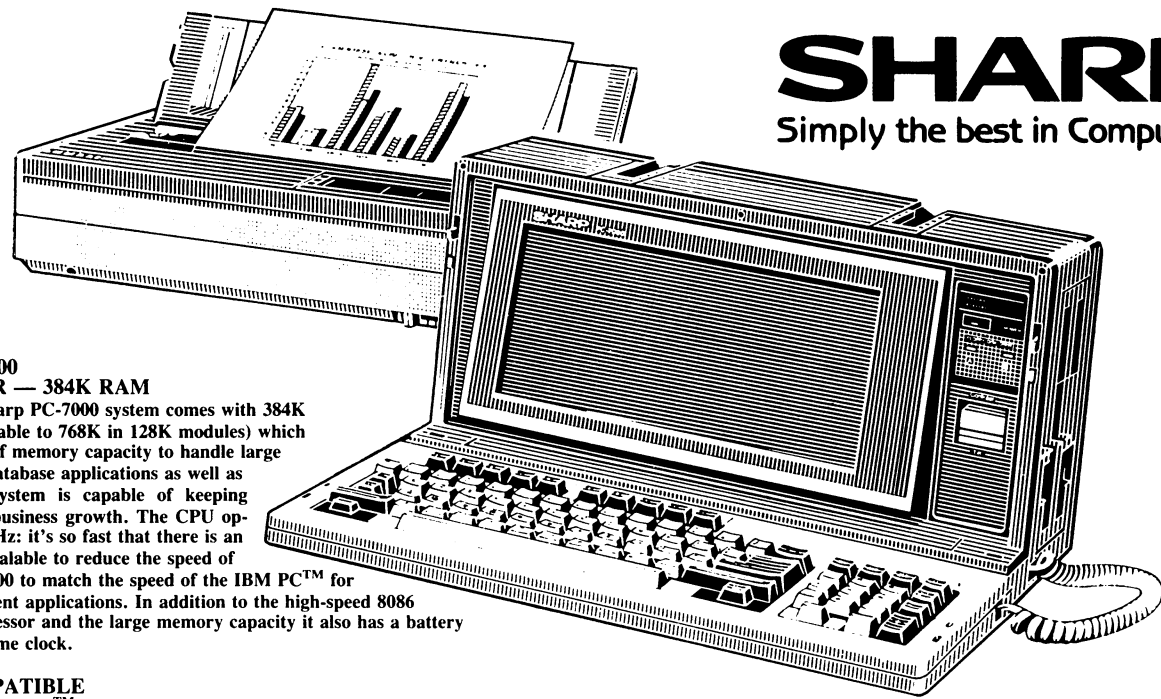
Senator Susan Ryan, Commonwealth Minister for Education, agreed. "Advanced technology does not start and end with the latest 'Star Wars' game or special effect from Hollywood. The reality is that advanced technology touches us all and the onus is on all of us to come to terms with that. Our education system must begin now to prepare us for a world where advanced technology and rapid change are part of everyday life."

Senator Ryan said the report's recommendations dealing with professional development in the school and tertiary sectors were particularly important. "This is the key to improving community understanding of technology and its importance. It is vital that we not only educate a small proportion of people to be technology experts, but also that we improve the general level of understanding among all Australians."

Among the report's recommendations were the following:

- The development of a community education programme addressing the social, economic and labour market aspects of technology in Australian society.
- The development of policies and practices which will foster in all students an understanding of technology, its likely impact on those aspects of our lifestyle we most value, and its potential to improve the social and economic life of Australia.
- Investigation and support of the use of information technology for diagnosis and remedy of learning difficulties.
- The intensification of effort in the professional development of teachers through, among others, longer programmes for in-depth training, the establishment of pilot projects in schools, demonstration centres and TAFE colleges, and support for the establishment of professional networks of teachers with expertise in technology-related fields across the sectors.
- The encouragement of tertiary education institutions to consult with the business sector to improve education/industry links.
- The encouragement of tertiary institutions to provide credit and short non-award courses directed at upgrading workforce skills, in a bid to overcome structural and technological change leading to redundancy and retrenchment among significant numbers of young and mature-aged workers.
- Reports from all education ministers on the benefits which might accrue from the co-ordination of the uses of Aussat across institutions and sectors.
- Investigation by the AEC of the establishment of an Education and Technology Centre to improve co-operation in the use of technology among education authorities across all states and sectors. □

A PC that's more powerful than the market leader & costs around $2000 less...



SHARP
Simply the best in Computers

SHARP PC-7000
REAL POWER — 384K RAM
The standard Sharp PC-7000 system comes with 384K memory (expandable to 768K in 128K modules) which provides plenty of memory capacity to handle large spreadsheet or database applications as well as ensuring your system is capable of keeping pace with your business growth. The CPU operates at 7.37 MHz: it's so fast that there is an optional mode avalable to reduce the speed of the Sharp PC-7000 to match the speed of the IBM PC™ for run-time dependent applications. In addition to the high-speed 8086 16 bit microprocessor and the large memory capacity it also has a battery supported real time clock.

FULLY COMPATIBLE
A high level of IBM PC™ software compatibility ensures a large, established software library making the PC-7000 ideal for the office environment. The PC-7000 runs Lotus 1-2-3™, Open Access™, Flight Simulator™, Symphony™ and most popular IBM compatible software.

ILLUMINATED CRYSTAL DISPLAY SCREEN
Taking advantage of the very latest in Sharp LCD technology, the PC-7000 features the first generation of back-lit Illuminated Crystal Displays. The bit-mapped screen uses an electroluminescent panel for back-lighting to provide enhanced screen visibility under any lighting conditions. A 25 line by 80 characters, 640 x 200 pixels display provides clear, detailed graphic images and text display.

BUILT-IN TWIN DISK DRIVES
The twin 5¼ inch disk drives are built into the main unit providing full computing power in the standard system and making it easy to obtain application programs from a huge range of off-the-shelf software.

'C' UTILITY LIBRARY.....$349

By Essential Software, over 300 functions, including all source code and demo programs.
The 'C' Utility Library includes:

- Best Screen Handling Available.
- Windows.
- Full Set of Color Graphics Functions.
- Better String Handling Than Basic
- DOS Directory and File Management.
- Execute Programs, DOS Commands and Batch Files
- Complete Keyboard Control
- Extensive Time/Date Processing
- Polled ASYNC Communications
- General DOS/BIOS gate
- Data Entry • And more

TCF.....$695

General Accounting System A 'Setof Books' on a computer
Basically, this system will keep track of all your accounting details that are normally handled by your accountant or by a manual bookkeeping system you may have. But TCF will do it much more quickly, accurately, and neatly.
You will have a choice of "books of account" into which you can enter information — much the same as your accountant, or your office staff, presently uses.

T/MAKER.....$749

Integrated Software Package for CP/M, MS-DOS, PC-DOS

- Wordprocessor
- Spreadsheet
- Database
- Spelling Checker
- Graphics
- Needs only 128K MS-DOS
- Needs only 48K CP/M
- CP/M 86 available.

(See review in August, Your Computer)

DSMET 'C' COMPILER.....$349

C Programmers Development System
Comes complete with:

- Assembly Compiler
- d bugger link

NEW 2.5 VERSION

TCF

THE COMPUTER FACTORY PTY. LTD.
214 Harbord Road, Brookvale N.S.W. 2100
Telephone: (02) 938 2522

AMERICAN GRAFFITI

BY HOWARD A KARTEN

BACK UP BEFORE IT'S TOO LATE

If you've fallen into sinful ways, microcomputer-wise, perhaps this story will goad you to get back on the straight and narrow, and into making back-up copies of critical data *right now*, before it's too late. This story might even save a small part of your sanity, or that of someone around you.

The first terminal-based system I ever used, attached to an IBM 360 many years ago, had what we wryly called 'less-than-perfect reliability'. In practical terms, that meant you made frequent back-up copies of whatever file you were working on. Official pronouncements from the Systems Programming Department grudgingly admitted the system occasionally went down "unexpectedly". (A day's experience on that particular system was sufficient to demonstrate there were events you could truly call 'unexpected'. We expected *anything* could happen, and we were rarely disappointed. Everyone got into the habit of making back-up copies frequently — say, every 15 minutes or so — so as to minimise the amount of work lost when the system actually did crash.)

In many ways, that was wonderful training. It taught you that when it came to computers and data and personnel, the only person or device you could really trust was the person attached to your fingers. You trusted no one and nothing — not the operators, not a data entry clerk, no one.

These habits carried over to my PC; it was about four months before I trusted my software and hardware enough not to do a SAVE every ten minutes. Perhaps I've been extraordinarily lucky since then, but in four years of using my PC — sometimes under heavy fatigue, or after a night of drinking coffee (or another liquid) to keep awake all night to meet a deadline — I've never managed to wipe out an entire disk.

Until yesterday.

The whole thing was innocent enough. I'd wanted to use the IBM COPY command to copy one file from drive B to drive A. When the system detected the disk in drive A was not formatted, I decided to format it.

So far, so good. The FORMAT command was on the DOS disk, which meant I had to insert that disk into drive A. I quickly exchanged the unformatted disk in drive A for the system disk, typed in the command FORMAT B:, and turned away for a moment to take care of something else. When the prompt came up on the screen, I automatically pressed RETURN, as I had so many times before.

By the time a little bell went off in the back of my head — not even 30 seconds later — and I frantically unlocked the disk drive door, it was too late: everything was gone. I'd clobbered a key disk, containing at least 50 critical files and nearly 100,000 bytes.

What had happened, of course, was that I'd become cocky about my ability to hang onto my files. Clobbered files and lost data were for others — those given high anxiety by computers. It wasn't supposed to happen to me. I was an ex-techy; I knew about back-up! I knew what not to do!

When my breathing and blood pressure returned to normal, I realised things weren't quite as bad as I'd first feared. By chance, I'd recently printed off the text in some of the wiped-out files, so a lot of the material could be recovered by rekeying it.

My wife, who's a computer consultant, needed only one look at my ashen face and rolling eyes to know something was wrong. She asked; I explained; she asked, "Did you have a . . ."; I didn't have to wait for her to finish to shake my head: "No."

She was simultaneously sympathetic and unsurprised. "I knew you'd get into trouble some day if you didn't back up your disks," she said. (That's Murphy's Law, isn't it? Make back-ups, and you'll probably never need them. Forget to make back-ups, and you'll need them for sure.)

From her perspective, that wasn't quite the worst of it. I tend to be a bit obsessive, so I couldn't let it go. I rekeyed some material, realised I could recreate more, and told her. The more I did, the more I remembered I could recapture, and, of course, was so happy that I kept sharing these good thoughts. Until she'd had enough and told me to shut up about it for the rest of the week.

The bottom line, as of now, is that my net losses are perhaps two or three non-critical files. And, of course, I've made back-ups.

Now, does anyone know where I can rent a nice large safety deposit box that's at least 13.5 cm wide?

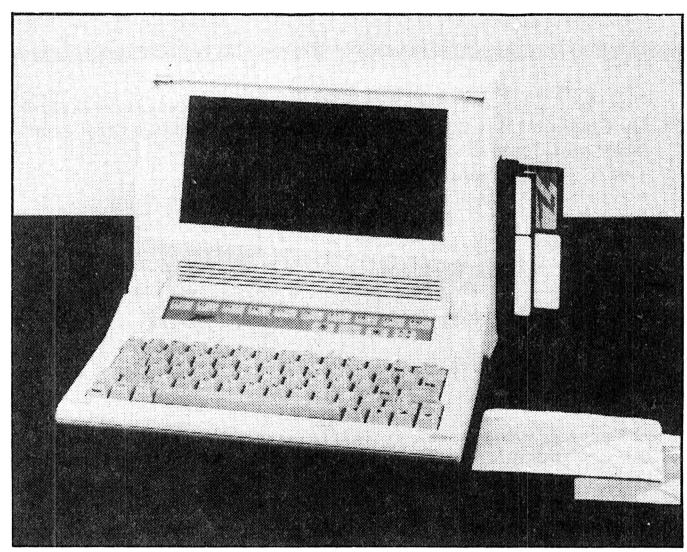
IBM FAILS TO SECURE LAPTOP CONTRACT

Over the past few months, we've been reporting about the United States Internal Revenue Service's efforts to equip its agents with laptop computers — perhaps as many as 20,000. Rumours have been flying about in the PC community that IBM had developed a laptop computer especially for this bid, and that, if it won the contract, consumers could expect to see a second portable from Big Blue.

Eventually, the Revenooers awarded Zenith Data Systems (Glenview, Illinois) a contract to supply between 15,000 and 18,000 of its Z-171 laptops over the next 18 months. The Z-171s for use by field auditors will all have 25-line by 80-character LCD screens (as well as the ability to connect to an external monitor), 512 Kbytes of memory, two 13 cm drives, and an internal 1200 baud modem. They will also have software purchased from other vendors, including R:base 5000 and the Enable integrated software package.

Zenith, until fairly recently best known as a consumer electronics company, has lately moved into microcomputing in a big way. It is the single largest Government microcomputer supplier, and second to Apple in selling micros to the education market.

Where does this leave IBM, and us consumers? Some industry sources are putting out the word — or the rumour, or the advance misinformation, depending on how desperate/gullible



The Zenith Z-171 laptop computer.

the listener is — that IBM will announce three new PCs, including the laptop, in early May. That could be, since price cuts from IBM are expected any moment. As we've often said here before, stay tuned.

ELECTRONIC MAIL ON THE MOVE

There have been several significant developments here recently in electronic mail.

First, AT&T announced AT&T Mail, its entry into electronic mail. AT&T is allowed, through the settlement a few years ago of an anti-trust suit against it, to offer computer-based services through an unregulated, separate subsidiary. AT&T has not fared especially well in its recent forays into the computer-enhanced services market; and, although the company is said to have already signed up as many as 200 corporate users, it faces some well-entrenched email vendors. In addition, it is now becoming evident that past predictions of email usage and dollar volume have been significantly overstated, so there may simply not be that much pie for competitors to cut up.

Separately, MCI Mail, one of the country's major forces in electronic mail (and certainly one of the most innovative), announced a technical link with the electronic mail abilities of Compuserve, the consumer-oriented database and communications service. Subscribers to either service will now be able to automatically send email to subscribers of the other service with no special additional processing. MCI Mail has also broadened its offering with the addition of bulletin boards, which earn royalties for the board owners.

Finally, Telecom Canada, a consortium of 10 Canadian telecommunications companies, and GTE Telenet Communications Corp, the packet-switched VAN carrier that's a subsidiary of United States communications firm GTE, have agreed to establish a link-up. This link-up, which will be achieved via the X.400 protocol, will also make it easier for subscribers to GTE's Telemail and to Telecom Canada's Envoy 100 service to reach each other.

SORRY, WRONG NUMBER?

One way some folks here make a buck is via a service that's casually called 'Dial-A-Porn'. Anyone calling a well-publicised New York City number can hear one or two minutes' worth of heavy breathing and sultry suggestions for intriguing things you didn't know the human body was capable of doing.

In New York recently, some customers making withdrawals from a Manufacturers Hanover Trust company cash-dispensing machine picked up the phone next to the unit to try to contact a human for assistance. Instead, they were automatically connected to to a Dial-a-Porn recording. Bank officials theorised that hackers had somehow gained access to the automatic dialling machine and reprogrammed it. They were understandably tight-lipped after issuing the obligatory preliminary explanations and apologies. "It's under investigation," they said, with characteristic banker's understatement.

ONE-LINER

Bits 'n' (mega)bytes: Apple has bought a Cray X-MP/48 supercomputer to simulate future Apple hardware and software architectures. □

FLOWLINE

*640K RAM
*2 X 360K DISK DRIVES
*BATTERY BACKED CLOCK/CALENDAR
*SERIAL, PARALLEL, & GAMES PORTS
*COLOUR GRAPHICS CARD
*EIGHT SLOT MOTHER BOARD
*XT OR AT STYLE KEYBOARD
*12 months warranty, parts and labour
*Turbo machine $100.00 extra

ONLY: **$1600.00**

NEC APC III PERSONAL COMPUTER

EG.

*2 X 640K DISK DRIVES 128K MONOCHROME **$3400.00**
*2 X 640K DISK DRIVES 128K COLOUR **$4000.00**
*1 X 640K DISK DRIVE & 20MB H/D MONOCHROME **$5000.00**
*1 X 640K DISK DRIVE & 20MB D/D COLOUR **$5600.00**

Phone for other NEC requirements

SPERRY PC IT

*1 X 360K DISK DRIVE 256 RAM, SERIAL, PARALLEL & MONOCHROME **$3900.00**
*1 X 360K DISK DRIVE 1 X 10MB H/D 256K, etc & MONOCHROME **$6400.00**

Phone for other Sperry requirements

IBM PC OPTIONS:

10MB HARD DISK & CONTROLLER **$875.00**
20MB HARD DISK & CONTROLLER **$990.00**
FLOPPY DISK DRIVE 360K IBM **$239.00**
8087 COPROCESSOR **$270.00**

COMPUTER MAINTENANCE AND REPAIRS.

FLOWLINE ENGINEERING, FOR ALL COMPUTER AND RELATED EQUIPMENT

Phone now for quote.

CALL WRITE OR VISIT OUR SHOWROOM AT:

375 NEPEAN HIGHWAY, FRANKSTON 3199.

or, SEND ORDER BELOW.

Name .....
Address .....
..... Postcode .....

Please rush me:
..... $ .....
..... $ .....
Enclosed please find cheque/money order for $ .....
Finance available to approved customers.

COMPUTERS

-The Compatible People
375 Nepean Highway, Frankston 3199.
Telephone - 783 5099 783 9457
Telex: AA 10717402

MONITORS:

SAKATA MONOCHROME **$180.00**
ROLAND MA121 MONO **$205.00**
ROLAND MA122 MONO **$205.00**
ROLAND CC121 COLOUR **$900.00**
TAXAN VISION 3 . . . . **$690.00**
DTX COLOUR MONITOR **$445.00**
RGB COLOUR MONITOR **$680.00**

PRINTERS:

SUPER 5 120 CPS **$475.00**
BROTHER 132 col 180 cps **$695.00**
BROTHER TWIN 5 . . . . **$1650.00**
DAISY WHEEL HR10 . . . **$389.00**
DAISY WHEEL HR15 . . . **$680.00**
NEC P2 . . . . . **$900.00**
NEC P3 . . . . . **$1100.00**

INTERFACE FOR IBM:

M/F CARD 384K/OK . . **$199.00**
MEMORY CARD/OK . . . **$99.00**
MONO GRAPHIC (HERCULES) **$199.00**
COLOUR GRAPHICS IBM **$169.00**
PARALLEL CARD **$69.00**
SERIAL CARD **$79.00**
DISK DRIVE CONTROLLER **$139.00**
HARD DISK CONTROLLER **$399.00**
JOYSTICK CONTROLLER . **$99.00**
APPLE CONNECTION CARD **$495.00**
MOUSE **$197.00**
JOYSTICK **$45.00**

DISKETTES:

5¼" SSDD HARD BOX . . **$35.00**
5¼" SSDD SOFT BOX . . **$25.00**
5¼" DSDD **$44.00**

MODEMS:

V21/V23 300/1200-75 **$199.00**
V21/V22 300/1200FDX AUTO ANS & DIAL (HAYES) **$499.00**
BAUD RATE CONVERTER INCL SOFTWARE **$230.00**

SOFTWARE:

ACCOUNTING 1 . . . . **$595.00**
WORDSTAR 2000 . . **$595.00**
DBASE 111 . . . . . **$795.00**
LOTUS 123 . . . . . **$799.00**
MULTIMATE ADVANTAGE **$800.00**
MULTIMATE 3.31 . . . . **$650.00**
JUST WRITE **$199.00**

Phone for other prices


Vectra
president

Duelling ATs

the FIGHT goes on

The IBM AT was something of a quantum leap in the quality of 'standards' for microcomputers, not to mention for IBM. Since its appearance the predictable rash of lookalikes has erupted, most of them superior in some way to the original model. Your Computer started comparing these machines — with each other and with the IBM version — in its Yearbook; this month Matt Whelan checks out five more ATalikes.

The apparent dilemma our judges faced when they decided a supercharged desktop was to be *Personal Computer of the Year* was choosing which one — the IBM AT, which started it all, or the lookalikes which provided superior performance and design.

However, given the criteria for the award, there was no real dilemma. The AT represented *the* significant advancement in technology last year — it was a big step up from what had preceded it, while the ATalikes were small steps up from the AT.

The judges' choice turned out to be easy. Yours, if you're in the market for one of these machines, won't be so simple. The original is clearly not the best in a number of areas, as our first comparison in the *Yearbook* showed. Three of its four competitors in that test were significantly better performers, while the fourth matched it on speed and killed it on price.

And it was the same story in our latest tests, with the power advantage of some of the newcomers striding even further ahead.

The big decision — whether guaranteed compatibility and support outweighs the speed differential — is yours. We're only going to present you with the information you need to make up your mind...

AT Least a Dozen

There are still too many ATalikes hitting the market for us to keep up — this group brings our review tally to 10 and we're at least two behind what's actually available in showrooms.

We didn't try to get hold of all the machines available, as the point of this issue's shootouts is to compare five units, but we certainly didn't have any trouble filling our five vacancies. And we're sure there'll be another five machines ready to go by the time we're brave enough to try ▶

one of these superchip comparos again.

The five latest IBM challengers selected for this test were:

Archives Micro Five: Designed by Micro Five Corporation in the United States (but manufactured in Asia), the Series 5000 is Archives Computers' entry into the AT market. While few people here would have heard of Micro Five, it was established in 1977 to develop specialised multi-user small-business and data communications systems, including voice/data orientated systems.

Its multi-user background shows in its approach to building an AT-style machine — while IBM seems to have designed a super-PC with multi-user capability, Micro Five has employed most of the available techniques to extract superior performance in the multi-user situation.

Hewlett-Packard Vectra: Like Texas Instruments, Hewlett-Packard has seen the IBM 'light' and is moving closer to full compatibility. It also still feels a little put out at having to design down to a standard, it seems, so it offers a little extra in its version of the AT.

The Vectra — again like TI's ATalike — offers vastly superior screen resolution. And where Texas Instruments has used superior design to fit more into its AT-sized box, Hewlett-Packard has used similar design skills to fit an AT-sized machine into a smaller, neater desktop.

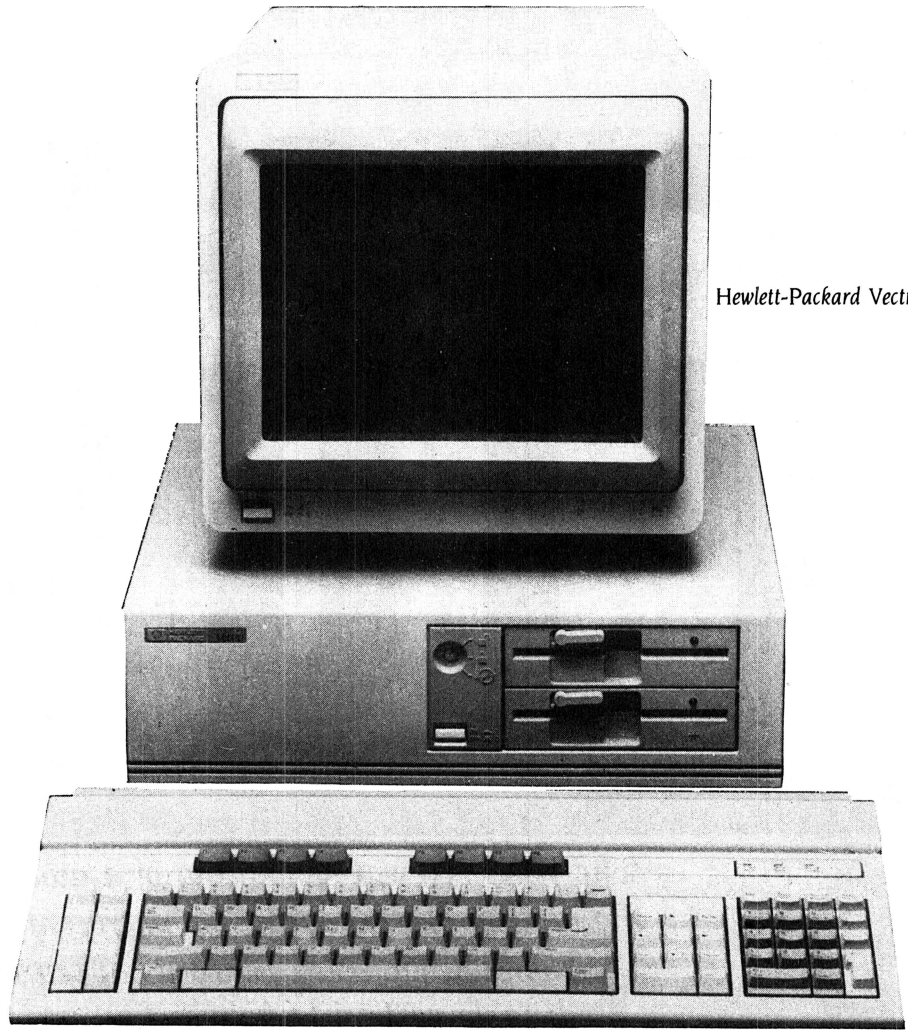
Osborne AT: Despite the problems facing Osborne in the United States, the Australian operation seems to be charging happily ahead. It is sourcing much of its machinery direct from Taiwan, and appears to be able to operate independently of its supposed 'manufacturer'.

On paper its machine is like the Kaypro 286i, featured in our last comparison — a lower-cost, straight compatible. In practice it is as 'non-standard' as the Vectra or the TI. It's the first machine we've tested to undercut the AT on both price *and* performance.

President AT: After introducing Osborne and Kaypro to Australia as a distributor, President Office Machines has moved into the own-brand business with a range of upmarket Taiwanese-made machines.

Its AT comes out of the same factory (or, at least, is made from the same major components) as the Osborne and, apart from the badgework and differing drive configurations, looks identical. Appearances can be deceiving — the President and the Osborne are further from each other than either is from the IBM AT.

Sperry PC/IT: Another big company with a big entry in the AT stakes, Sperry is making more noise about its 80286 contender than it ever did about its PC lookalike.



Hewlett-Packard Vectra

The Sperry PC, an excellent machine with some distinct advantages over the IBM PC, was never really pushed outside the company's direct customers. The PC/IT continues the design theme with improvements over the IBM, but hopefully doesn't continue in the 'silent-mode'.

Like the Micro Five, the IT has an obvious leaning towards multi-user operation. It has an excellent Xenix implementation, and can support up to nine users.

GreAT ExpectATions

We expected to see some real performance from this group, but weren't quite prepared for the result in a few areas.

We knew the Micro Five would be fast, but it still shocked us with its tingling performance. We expected the President and Osborne to be straight clones, but one exhibited far superior performance to the AT and the other turned out to be surprisingly slower.

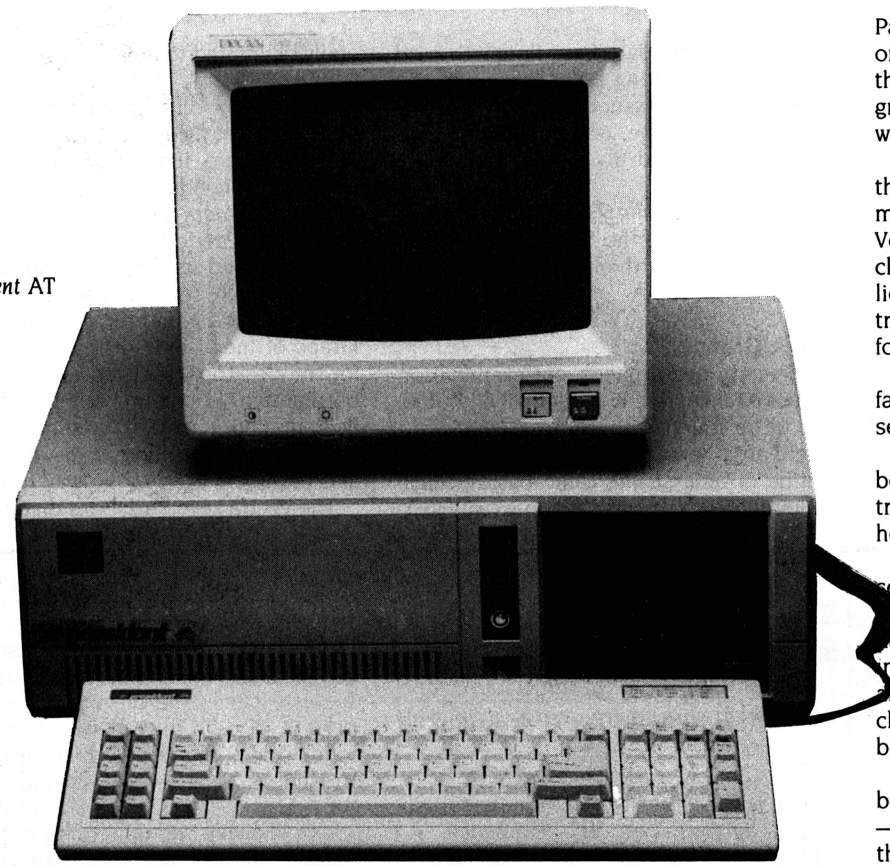
One thing this latest series of tests did was to remove any doubt about which is the quickest ATalike we've tried — last time NCR, Compaq and TI shared the honours, but this time the Micro Five put them all in the shade.

The Micro Five 'won' six of the nine performance tests, finished a very close second in another, and posted respectable times in the remaining two. It is clearly the fastest AT-style machine we've seen, and we tested it without the cache buffering which will be standard on all the machines sold here!

In fact, its performance was all the more remarkable because it achieved it on a 'dirty' disk. We only had the machine for a very short time, and couldn't empty the hard disk before our tests as we did with all the other ATs. Under normal circumstances, we would expect higher performance on the disk-intensive tests on a freshly formatted disk (for a description of the individual tests, see the separate box).

Also remarkable was the low performance of the Osborne — it was so far off the pace in the processor-only tests that we immediately opened it up to check it really had an 80286 fitted. On these two

Duelling ATs



President AT

tests the times were almost identical to the 80186-equipped Adler P50. It did have an 80286, so we're at a loss to explain why it was 25 per cent slower overall than the IBM.

We plan to ask Osborne for another machine to verify the tests — we suspect this one might have been 'fiddled' with extra wait states during internal testing and inadvertently left that way when it was sent to us. We hope so . . .

WATch 'em Fly

Full details of each machine's performance on the individual tests can be seen in the accompanying charts, but it's worth a closer look at some of the results:

BBBMark: Last time this test separated the machines into two distinct groups — the 'hotrods' with 8 MHz processors, and the 'ordinary' ATs — but was otherwise inconclusive.

This time it was a different story. A new 'group' was created by the Micro Five, which combines 8 MHz processor speed with zero wait states. It ran an incredible 5.6 seconds, 1.3 seconds better than the 8 MHz 'stars' of the previous test.

President, Hewlett-Packard and Sperry aligned themselves with the formerly top-rating group, with identical times of 6.9 seconds — equal to the Compaq and a tenth of a second better than the previous overall performance winner, the NCR PC8.

The Osborne gave an early indication of its sluggishness on this one, clocking in at 12.5 seconds; while that's twice as fast as the IBM PC, it's a surprising 3.4 seconds slower than the AT.

CBSieve: This one was exceptionally close last time, with a meagre six-hundredths of a second separating the leaders. President managed to stretch the spread to fifteen-hundredths — six machines are bracketed between its 3.56 seconds and the 3.71 seconds scored by the Sperry.

The President had clearly established its membership of the 'hotrod' club at this stage, beating all the speed stars from the last comparison as well as the obviously rapid Hewlett-Packard and Sperry entries.

But it had to be content to sit in the shadow of the Micro Five, which again blitzed the opposition. It ran an incredible 2.89 seconds, and, if we're still talking in hundredths, that puts it 67 ahead.

The Osborne failed to restore its reputation on this test, running 7.05 seconds — almost twice the time taken by the Sperry, which finished in fourth place out of this group. And even compared to IBM's low-scoring 4.89 it's a real disappointment.

Lotus: Once we moved away from straight processor speed the Hewlett-Packard and the Sperry got their own back on the President (for a while, at least). All three again sat neatly in the high-speed group established last time, and all three were again trounced by the Micro Five.

The Micro Five posted 22.0 seconds for the Lotus file load test, which was only marginally ahead of the Sperry (22.8), the Vectra (23.2) and the President (23.5). The closeness of this result confirmed our earlier observation on the limitation disk transfer speed places on these high-performance machines.

A mere 1.5 seconds blanketed the four fast machines — only the Osborne, at 10 seconds off the pace, stood out.

The recalculation test and the file-save both require some 'thinking', so the disk transfer rate limitation is less relevant; here the Micro Five again streaked ahead.

On the recalculation it came in at 4.9 seconds, again better than any of the machines we've timed. The Hewlett-Packard had its moment of glory on this one, rating a close second at 5.5 seconds, just ahead of the Sperry at 5.8. The President clocked in at 6.0 seconds, and the Osborne at 10.8.

The file save showed unusual slips for both the Hewlett-Packard and the Sperry — at 23.0 and 25.1 seconds respectively they dropped to the 'slow-coach' level established in the earlier comparison. The Micro Five stayed up at the front of the pack, however, at 12.9 seconds, and the President retained its position in the fast lane with 14.1 seconds.

dBase: The three-stage dBase benchmark seems to be the main area for turning up surprise results. Last time it was the NCR's super-fast performance in this test which put it on top overall. This time we saw a mixture of snail crawls and blinding performances which upset the overall results.

The CPU-intensive first stage provided the first upset, when the Micro Five sank to fifth out of the 10 machines tested in both comparisons and third out of the five machines in this group. Its respectable 294 seconds was no match for the 283 of the Vectra and the 287 of the Sperry, even if it beat the President (306) and the Osborne (dare we say it . . . 569).

The Archives machine turned the tables in the second stage, screaming to an unbelievable 258 seconds — we thought the NCR was quick last time at 315! The President and the Sperry were closer to 'normal' with 382 and 393 seconds respectively, while the Vectra fell in a hole at 472, ahead of only the Osborne at 533.

In the final stage the Micro Five dipped out by two seconds on beating the NCR's blinder of last time (at 351 seconds, it had ▶

swamped the opposition), but was safely ahead of the rest. The President's 425 seconds sounds slow in comparison, but is the third-fastest time we've recorded on this test and was good for second place this time.

Sperry decided to join Hewlett-Packard in its hole this time — and it dug in deeper with 573 seconds compared to the Vectra's 514. Both times make the Osborne's 605 seconds look almost respectable . . .

This test confirmed a problem, hinted at in the Lotus tests, for these two machines — their hard disks are slow. While they clearly have superior processor performance, they simply can't shove the data in and out fast enough.

Doit: Shoving data from floppy to hard disk wasn't a strong point for any of the machines in this issue's group — the fastest, the Micro Five, rates no better than fourth when lined up against the earlier tests.

It ran this test in 66.2 seconds to beat the Vectra on 70, the Sperry on 71.3, the Osborne (yes, fourth place!) on 79 and the President on 85.5.

AT A Glance

Apart from performance, our examination of the ATalikes will necessarily be limited. As we've found with endless PC clones, there are only so many times you can describe or analyse the same basic design. Comments on these machines will generally be limited to areas of significant difference.

The clearly different machine of this bunch was the Hewlett-Packard. Like the TI Businesspro, it pretends it isn't an AT clone, but provides the compatibility 'for those customers who might need it'. Its styling is vastly different, as is its screen resolution and its software emphasis.

It's a much smaller machine than the AT, which isn't a bad thing at all — these lumps of metal are getting far too bulky for the desktop. However, even the HP is big enough to confirm our belief that a floor-mounted 'tower' configuration, as supplied with the Sperry (a b-i-g machine) and the Micro Five, is the way to go.

The Vectra keyboard looks distinctly dif- ▶

AGAINST THE STOPWATCH

Performance is what the AT is all about — and it's the one area in which most of its competitors seek to outgun it — so that's where we started both our comparisons. This issue's tests are the same as those we used in the January YC Yearbook comparison. For those who missed the original story, here are the details of the performance tests used.

Lies, damn lies, statistics . . . and benchmarks. Benchmarks can be misleading, we know, but in the case of a direct comparison of such similar machines we consider any measured test a valid indicator. We didn't set out to create special benchmarks to test the ATs — we simply put together a collection of tests we've used before and added a few that happened to take our fancy at the time.

Our tests measured straight processor speed in only two cases (to give us an idea how the different versions of the 286 compared), and in the others measured overall performance in typical user situations. The tests were:

■ **BBBMark** — Boring, BASIC Benchmark isn't really what it stands for, but it will do. It's a straight do-almost-nothing loop in Microsoft BASIC which tests the processor's ability to run around in circles. It goes like this:

```
10 FOR I=1 TO 10000
20 A=A
30 NEXT I
```

■ **CBSieve** — a compiled CBASIC (Digital Research's CB86) version of old faithful, the Sieve of Eratosthenes. You'll usually see the Sieve benchmark written in C, occasionally in MBASIC — we just happened to have a CB86 compiler for the ATs, and no C compiler at the time. It doesn't really matter for the sake of our tests, but you can't compare these Sieve times with those in other languages on other machines.

■ **Lotus** — a three-stage test using one of the most popular PC packages, Lotus 1-2-3. We timed the machines loading a 300-Kbyte-plus file, recalculating it, and saving it to disk again. The spreadsheet contents were meaningless, simple calculations duplicated in blocks until they filled the available memory of the 512 Kbyte AT.

■ **dBase** — another three-stager, used often by Les Bell to compare the overall speed of test machines. The results of this test can't be compared to our previous dBase benchmarks, however, as we used the new Version 2.43* and made the test five times as long. The first stage of this test measures computation speed, the second a combination of CPU power and disk I/O, and the third straight file handling and disk accessing.

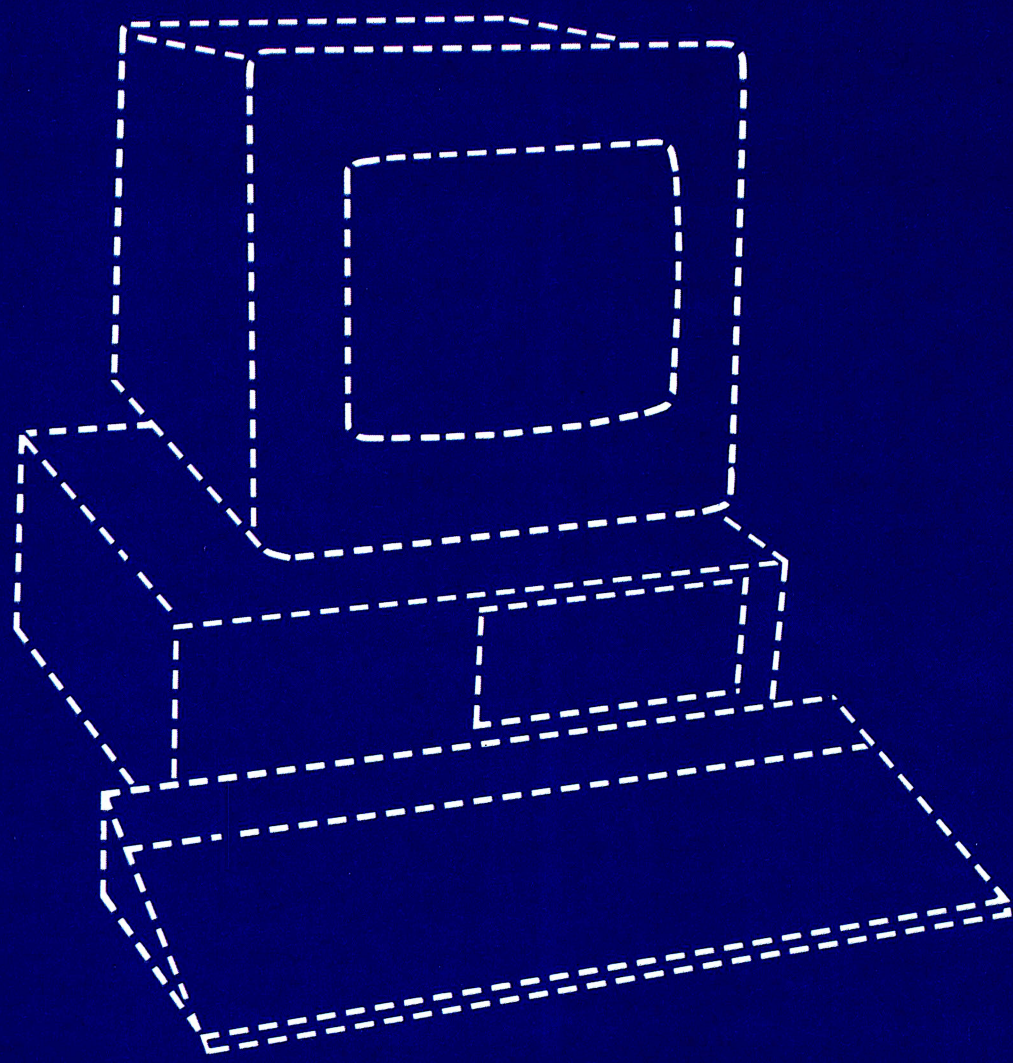
■ **Doit** — Just something we needed to do for the other tests, so we made it a test on its own . . . our Doit batch file loaded three quarters of a megabyte of files onto the hard disk from the AT's 1.2 Mbyte high-speed floppy, from three subdirectories on the floppy to three newly created subdirectories on the hard disk. This gave us a measure of floppy-to-hard-disk transfer speed.

We measured each machine several times on each test, and drew up a chart of the results. In the first comparison we rated each of them on the results, and drew up a performance grading chart. The rating system was simple — the fastest machine on that particular test got 100, and the others were given points that amounted to their time expressed as a percentage of the winner's. This system seemed less valid this time, when we wanted not only to compare the five machines in this test, but also rate all 10 ATs tested against each other.

So this time we decided to rate all the challengers against the 'standard', the IBM AT. We compared each machine's times against the AT and rated them as a percentage of the IBM. Thus a machine with similar performance to the AT would show up as 100 per cent, one with 20 per cent better performance would show up as 120 per cent, and so on.

On the first test we had the NCR machine for a short time only, and missed the Doit test on it. For the sake of the final ratings we left the test out of the overall score, although the times were included in the results chart. We have decided to give it an 'estimate' for this test so our future ratings charts (including this issue's one) can give a complete overall rating to the other machines. The estimate is based on its performance on the other tests, and takes into account its strengths and weaknesses.

All the machines were set up as similarly as possible for the tests. Their hard disks were formatted and loaded with exactly the same files, in the same order. We ran the tests in the same order on each as well. □



THE PERFECT PERSONAL COMPUTER FOR YOU HASN'T BEEN BUILT YET.

Interface Publications, which pioneered quality, low-priced software in Australia, now has a host of new and proven programs for the IBM PC, Apple and Commodore 64. In keeping with the Interface philosophy on software, all of it is well below the recommended retail price, all of it is non-copy-protected, and all of it is good!

Tim Hartnell, prolific computer author, and one of the best-known Australians in the personal computer field, is head of Interface Publications. Although Tim lives in Melbourne, he travels overseas to the UK and USA — where Interface has offices — two or three times a year. Recently, he decided to approach software developers directly, and bring back software to Australia which was not only extremely good, but which Interface could offer at realistic prices.

TIM HARTNELL DOES IT AGAIN!

( ) **COMMODORE 64 ZAP-LOADER** — speeds up disk loading by three to five times, adds commands DIR, SCRATCH, REPLACE and VALIDATE. **$24.95.**

( ) **COMMODORE 64 EXTENDED BASIC SERIES 7 — $24.95.**

( ) **APPLE UTILITIES DISK A** — a host of incredibly useful Apple utilities; recommended price is $99.95, our price **$39.95.**

( ) **IBM PC RAMDISK** — size of disk is variable — **$29.95.**

( ) **ADVENTURE DOUBLE** — for Apple or Commodore. Escape from **Colditz Castle** and discover the secrets of **The Neilson Papers** — rrp is $34.95, our price just **$24.95.**

( ) **IBM PC PROGRAMMER'S TOOLKIT** — Incredibly useful collection of programs and routines, complete with detailed operating instructions, to assist you in developing programs and making the most of your disks. TOOLKIT contains AUTODEX to allow you to copy, modify, rename, run and otherwise manipulate disk contents, SECTSAVE to salvage bad sectors, and much, much more. RRP is $149.95, the Interface price is only **$69.95.**

( ) **IBM PC SOFTWARE ESSENTIALS** — Four disks, plus an operating manual, crammed full of value! Here's what you get: PC-WRITE (word processor), PC-YEARBOOK (electronic diary), PC-FILE (general database), BIGCAL, TYPERITE, PORTWORTH (portfolio management), PC-DIAL (general purpose communications program), NEWKEY (like 'Prokey'), CALENDAR, BARCHART, MEMBRAIN (RAMdisk), PRINT SPOOLER, FREECALC (spread-sheet calculator), MICRO-ACCOUNTING SYSTEM, GENERAL LEDGER. All this, and more, for just **$84.95!**

( ) **THE APPLE TOOLBOX.** Now, for just $39.95, you can have the most useful collection of Apple programming tools on the market. This is our most acclaimed Apple program, which comes with a comprehensive, easy-to-follow manual. Manipulate your disk contents and DOS with ZEAP, convert binary machine code programs into DATA and POKE statements, change DOS commands to whatever you want. DRAW takes any Lo-Res screen and writes a BASIC program to draw it precisely. And much more. This is just a sample of what is available. Recommended price is $149.95, our price only **$39.95.**

Turbo Pascal!

( ) **Turbo Pascal Utilities** — if you have Turbo Pascal, you need this collection of incredible utilities, developed by the PC Software Interest Group, to make the most of the language. Complete with detailed, on-disk documentation, and ideal for beginner or experienced Pascal programmers. Just **$39.95!**

( ) **THE DYNADESK SUITE V2.1** for the IBM PC. Here's the program we're most proud of. The amazing DYNADESK offers five handy accessory programs, all with exclusive capabilities to make DYNADESK the single most effective business, club or home office tool you'll come across. Each program is menu-driven so you can select the activities you want at the touch of a key. Each program follows a common format. Learn one, and you've learned the lot!

DYNADESK V2. 1 includes DYNABASE which sets up a database system which holds 250 entries per file, any one of which can be accessed, printed from or modified in a fraction of a section. DYNAWORD is a word processor which is ideal for short documents (up to 30 pages in a single file) and for multiple printouts. DYNANOTE is a 'note maker' program, holding 200 notes to a file which can be accessed by date, topic or number. CALENDAR prints out (to screen or printer) a calendar for any year this century. DYNAMAIL provides a complete mailing service, directory and phone book. Store client names, stock items, club members names, addresses and phone numbers, along with an identifying code. Access by name, by identifying code (think how useful that would be, to select all of a particular type of customer, automatically) and more. DYNAMAIL will even print out contact lists, complete file dumps, or address labels for you.

With all these facilities, you can see why the recommended retail price of DYNADESK is $199.95. Interface is selling it, with comprehensive manual along with the source code of the whole program for just **$69.95!**

( ) **THE CASINO BUSTER!** IBM PC. Here's an exciting set of programs, in which you can use your PC or compatible to get an edge on the casino. The package, consists of six complete computer simulations, which exactly duplicate casino rules, conditions and odds of a SLOT MACHINE, NEVADA BACCARAT, TRENTE-ET-QUARANTE, BLACKJACK, ROULETTE and CRAPS, along with detailed rules on how to play the games under casino conditions. Now you can learn how to do it at home, so you won't be embarrassed at the casino! Along with the programs on disk comes a large, detailed manual which explains how gambling systems are developed under casino conditions, gives explicit details of a score of such systems, showing how they worked in hundreds and hundres of plays, and illustrating clearly how you can use them in practice in the casino. If you like gambling, and you want to get the winning edge on your firends, and the casino, this major package, developed by DRESS CIRCLE SOFTWARE, is for you. The recommended retail price is $495.00, but from us it is just **$185.00!**

( ) **T.I.E.S.S. — The Interface Expert System Shell** — create your own Expert System on just about any subject you choose. T.I.E.S.S. works out its own decision rules, learning from the examples you give it. Comes with detailed manual. IBM PC only, **$39.95.**

Language Tutors!

( ) **LISP** — teach yourself the leading Artificial Intelligence language with THE LISP TUTOR. Apple and Commodore versions are just **$34.95** each, while the IBM PC version (which comes with XLISP on the disk, along with the Tutor) is only **$39.95.**

( ) **FORTH** — master this fascinating language the easy way with our popular Forth Tutor. Apple and Commodore 64 versions are just **$39.95** each, while the IBM PC version (which comes with a complete implementation of FIG FORTH, on two additional disks) is **$49.95.**

( ) **PROLOG** — the language used by the Japanese fifth-generation project can now be mastered by you quickly at home. Apple and Commodore versions of The Prolog Tutor are only **$34.95** each, while the IBM PC version (which has, in addition to the Tutor, a complete Prolog implementation) is **$45.95.**

( ) **GRAPHICS LOGO** — only available (at the moment!) for the IBM PC, this is an implementation of Logo, with a comprehensive and fully-illustrated instruction manual, so you and your kids can master the graphics side of the language. Only **$39.95.**

Rip this page out of the magazine, send us a copy or a note, together with your cheque, or credit card (VISA or BANKCARD) details, and we'll get your software to you. Add $3.00 per order for post and packing.

To: **Interface Publications (Australia) Pty. Ltd.**
Chelsea House, 34 Camp Street,
Chelsea, Vic., 3196, Australia

( ) Please send me a complete catalogue.

Please send me the software indicated.

I have an [ ] Apple [ ] IBM PC [ ] Commodore 64

I enclose a cheque for $_____ or charge my credit card

[ ] BANKCARD [ ] VISA

_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_| Expiry date _____

Name _____

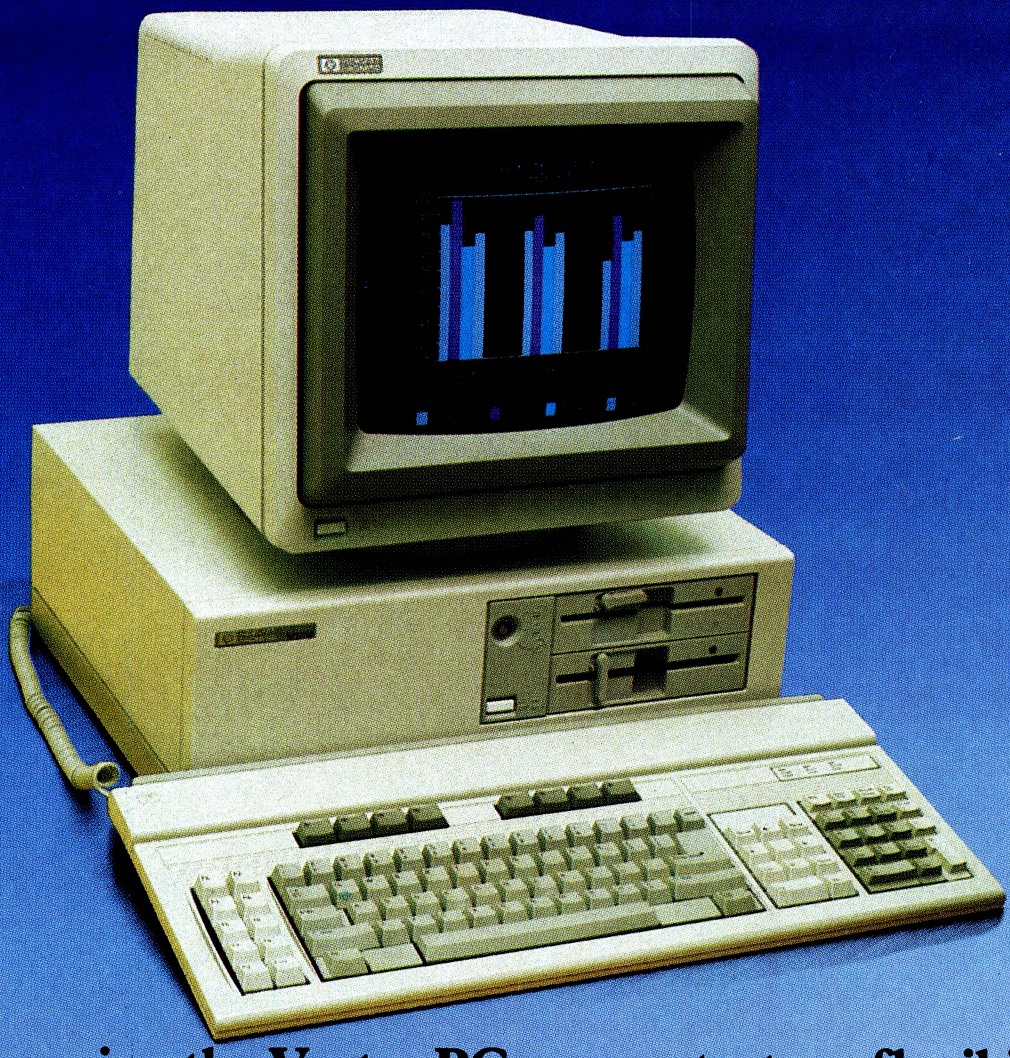
Address _____

_____

Phone_____ Postcode_____

Interface Publications (Australia) Pty. Ltd.

Hewlett-Packard will build yours after consulting the expert – you.



Announcing the Vectra PC concept – true flexibility to tailor the perfect solution to your needs.

Because in business, no two individuals have exactly the same needs, Vectra has been created to allow you to buy a PC tailored to suit your specific requirements. It offers enormous scope in terms of hardware and software applications and enables you to select the power, speed and memory capabilities that are right for you. Plus you have the option of using the Touchscreen facility or HP Mouse.

As Vectra is compatible with the IBM PC/AT, you can choose from thousands of popular business software programs – right off the shelf.

Vectra is the powerful PC that can grow with you. Its modular design means that future system expansion will be easy.

Vectra is so flexible it can be virtually anything you want it to be. Its arrival presents an ideal opportunity for you to invest in HP's renowned technical excellence at a competitive price.

Find out how the Vectra PC can fit your needs by calling your local authorized Hewlett-Packard dealer or Hewlett-Packard direct.
Melbourne (03) 8952895 Sydney (02) 8884444
Adelaide (08) 2725911 Perth (09) 3832188
Brisbane (07) 304133 Canberra (062) 804244

Vectra
HEWLETT
PACKARD

Leo Burnett 7696 HEP 90533/B

K/D Computer Work Stations

D-258L WORK STATION ■ D-2L CRT TABLE ■ D-5L CORNER LEAF ■ D-8L PRINTER STAND

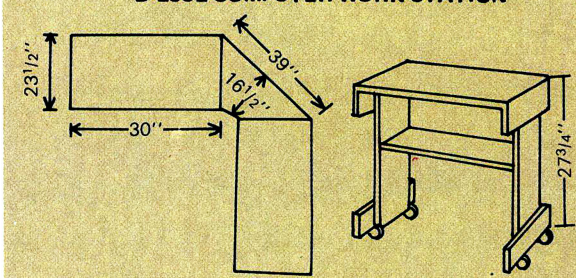
- Economical
- Modular
- Do–it–Yourself
- Save Space
- Easy Assembly

D-258L
$374 incl tax
D-20L
$234 incl tax

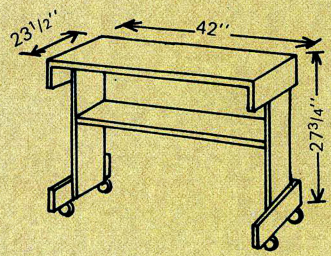
dealer enquiries welcome

Material:
Chipboard/Oak PVC woodgrain overlaid.

D-258L COMPUTER WORK STATION



D-20L COMPUTER TABLE



D-20L COMPUTER TABLE

The compact ADE K/D computer work stations allow you to create a customized computer work station for your system that is both functional and exceptionally good looking.

ADE COMPUTERS PTY. LTD.
28 Haughton Road, Oakleigh,
Victoria, Australia, 3166
Telephone 568 7877 Telex AA36384

Toll free order line
Tel: 008 033508
for orders only

Duelling ATs

	BBBMARK	CBSIEVE	LOTUS 1-2-3			dBASE II BENCHMARK			DOIT
			Load	Recalc	Save	Stage 1	Stage 2	Stage 3	
MicroFive	5.6	2.89	22.0	4.9	12.9	294	258	353	66.2
NCR PC8	7.0	3.70	23.3	6.0	14.0	280	315	351	68.0
TI Turbo	7.3	3.64	23.4	6.0	14.4	307	391	435	46.0
Compaq 8 MHz	6.9	3.69	22.5	5.5	13.8	281	434	476	62.3
President AT	6.9	3.56	23.5	6.0	14.1	306	382	425	85.5
HP Vectra	6.9	3.69	23.2	5.5	23.0	283	472	514	70.0
Sperry PC/IT	6.9	3.71	22.8	5.8	25.1	287	393	573	71.3
IBM AT	9.1	4.89	23.8	7.7	23.3	378	408	458	57.0
Kaypro 286i	9.1	4.89	23.5	7.7	23.5	379	403	452	77.3
Osborne AT	12.5	7.05	33.5	10.8	24.0	569	533	605	79.0

Figure 1. *The performance figures tell the story: the Micro Five ran away from the others on this comparison, and also zapped the power leaders from the previous test. The President, Hewlett-Packard and Sperry machines were up there with the quickies from the previous shootout, but dropped behind in a few of the tests. Osborne's poor performance is being investigated, and may result in a re-test.*

ferent, and much of that is due to the colouring and typography/design of the keytops. We liked the well-engineered feel, but remain unconvinced about the design — while it's the sort of thing an owner gets used to very quickly, at first glance it's a little confusing.

It basically follows the IBM standard layout, with additions including an extra eight function keys along the top of the keyboard — these are put to use by the user-friendly PAM shell and software Hewlett-Packard prefers to use in place of COMMAND.COM.

The Sperry keyboard had us jumping with joy and screaming at the same time — some changes from the IBM 'standard' we loved, some we hated. Now everyone knows the Escape key's location, IBM moved it (for no good reason). Sperry put it back. But then it moved the Alt key, and there is only one standard for that. It also laid the function keys horizontally, so you can throw away the function key overlays provided with many software packages.

Sperry also provides a separate cursor control pad and a Reset key, and an Enter ▶

	BBBMARK	CBSIEVE	LOTUS 1-2-3			dBASE II BENCHMARK			DOIT	% Of IBM
			Load	Recalc	Save	Stage 1	Stage 2	Stage 3		
MicroFive	162	169	108	157	180	128	158	129	86	142
NCR PC8	130	132	102	128	166	135	129	130	83	126
TI Turbo	124	134	101	128	161	123	104	105	123	123
Compaq 8 MHz	131	132	105	140	168	134	94	96	91	122
President AT	131	137	101	128	165	123	106	107	66	119
HP Vectra	131	132	102	140	101	133	86	89	81	111
Sperry PC/IT	131	131	104	132	92	131	103	79	79	110
IBM AT	100	100	100	100	100	100	100	100	100	100
Kaypro 286i	100	100	101	100	99	99	101	101	73	97
Osborne AT	72	69	71	71	97	66	76	75	72	75

Figure 2. *We changed our overall ratings to allow measuring the challengers against the 'standard', the* IBM AT. *On each test the* AT*alikes are rated as a percentage of the* IBM*'s performance, and the '% of* IBM*' column compares their overall performance to the* AT. *So, for example, the* Micro Five *is* 42 *per cent ahead of the* AT *(it's up to* 80 *per cent ahead on individual tests), the* President 19 *per cent, and so on.*

key on the numeric keypad instead of the oversized plus-key. Hooray!

And, to be fair, our criticisms are only of one of Sperry's three keyboard efforts. It also offers a completely standard AT-style keyboard, so the choice is yours.

The Sperry has the same eight slots as the IBM, but more are usable: the disk controller plus two serial and one parallel ports are integrated on the main board, which also includes space for the first megabyte of RAM.

Our test unit came with a 44 Mbyte hard disk, divided in half with DOS and Xenix partitions. We didn't spend a lot of time with it, but the Xenix port, by SCO (Santa Cruz Operation), looked good. It provided four 'virtual' consoles on the main screen (up to eight can be handled) with allowance for a further eight serial terminals. Xenix is finally seeing worthwhile software support, and is worth considering if you want to make the most of the power of these machines.

The Micro Five sounds like the best Xenix engine of them all — most of the advanced features relate to multi-user ▶

ALGOL

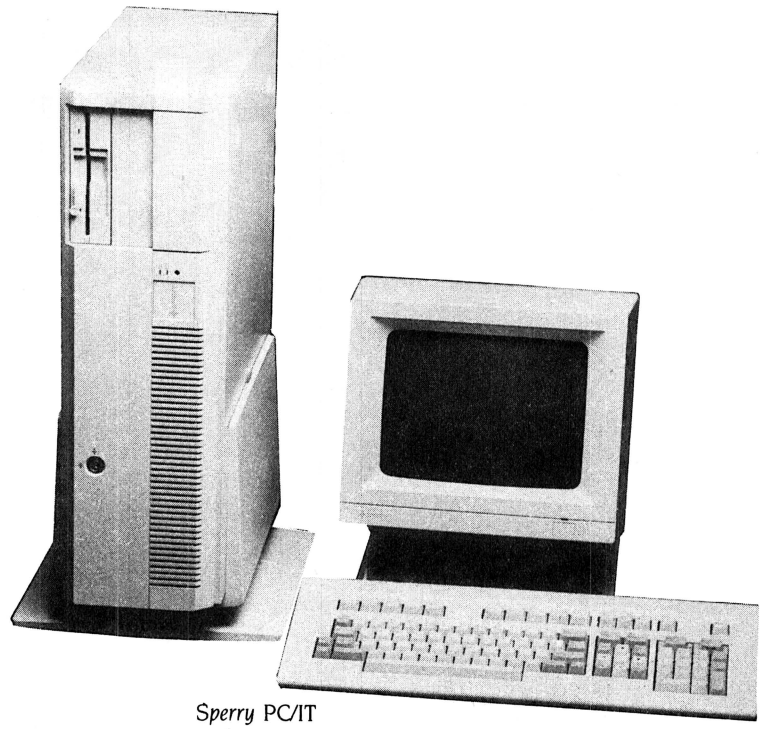
ALGOL HAS A SOLUTION FOR ALL YOUR COMPUTING NEEDS

Whether IBM or Apple Systems—we give you complete compatibility.
We also provide a full supply of interface cards capable of handling all the tasks you can ask of your computer system.
Our products offer you dependable reliability.
Start enjoying quality you can trust today.

ALGOL ENTERPRISE CO., LTD.
P.O. BOX 83-35, Taipei, Taiwan, R.O.C.
TELEX: 23682 ALGOL, TEL: (02) 8343255

Duelling ATs

Osborne AT



Sperry PC/IT

operation, and it looks as if it could overcome our biggest objection to Xenix, speed (more specifically, the lack of it). Unfortunately, we grabbed one of the first machines in the country, for only two days, and it didn't have Xenix installed so we can't verify the company's claims.

Archives was due to receive a release version of Xenix Dataflex shortly after the Micro Five, so its locally written System Solutions software should be available in multi-user form on the machine by the time you read this.

The President and the Osborne both looked like straight AT copies, although they had some useful add-ons. The Osborne had an Irwin tape back-up unit fitted, although we couldn't test it as we didn't have a blank tape of the right (mini) size.

The President's Everex unit used 'standard'-sized cartridges, and came with excellent software. It allowed virtually instant (five minutes for 20 Mbytes) streaming back-up, yet could restore files individually after they were selected from a directory display identical to that seen from DOS.

The President also featured a switchable mono/colour display adaptor card, a useful device under certain circumstances.

WhAT Price a Super-PC?

As we discovered in the *Yearbook*, AT-style performance doesn't come cheap. The AT itself represents around $12,000 kitted out ready to go (we don't even want to think about a floppy-only machine).

Fully equipped, the Micro Five is a shade more expensive at $12,960 — but it offers a whole lot more for the money.

The Sperry and the Hewlett-Packard come in just under the IBM's price, at $11,745 and $11,420 respectively: with the Vectra that includes two floppy drives as well as the 20 Mbyte hard disk, and with the Sperry it includes a 44 Mbyte hard disk.

The President represents good value at $7420 for the hard disk model, plus the cost of a monitor and display adaptor — between $1000 and $2000, depending on the quality of the monitor. Our machine, configured with a top-quality colour monitor and the 60 Mbyte Everex tape drive, was worth $11,900.

The Osborne was the cheapest of the units tested, at a base price of $6950 for the hard disk model.

The AT represented the significant advancement in technology last year — it was a big step up from what had preceded it, while the ATalikes were small steps up from the AT.

Which AT for Me?

Now things get tougher. I came up with three possibles last time (the TI if the company was paying, the Kaypro if it was my own (limited) cash, and the IBM if I was recommending one to a friend).

This time I have 10 to choose from. Can I have one of each? No, I thought not . . . Well, let's look at it two ways — selecting one from this group, and selecting one overall.

From this group I would have to look hard at the President because of its excellent performance-per-dollar ratio. But the ultimate performer, the Micro Five, is also excellent value at a starting price of $9948 for the 20 Mbyte version . . . and if my application were multi-user, I'm sure (with a little more testing) the Micro Five would be unbeatable.

Overall? A similar story, I feel: if I used my still-favourite financing (the boss's money) I wouldn't hesitate to grab the fully kitted-out Micro Five; if it was my still-limited cash, I'd look at the President; and, if I were recommending one to an 'uninitiated' friend, it would still be the IBM. If the IBM caused them problems, they would blame IBM; with any other machine, they would blame me . . . □

In modems, you'll find NetComm stacks up better than the rest.

When it comes to ours or theirs, only NetComm has a modem to suit every communications need.

Whether you require the super-fast performance demanded by major businesses, or everyday low-speed operation (or a combination of both!), you'll find your modem in this table.

You can't go past NetComm: Australia's most-popular, most-proven and best-performing modems — and Australia's biggest range.

MODEL	DESCRIPTION	FEATURES	BAUD RATES
SM850	Modem 3+12	MD, MA, ASY	300 FDX, 1200/75 FDX (V21, V23, Bell 103)
SM860	AutoModem 3+12	AD, (PD only), MA, ASY	300 FDX, 1200/75 FDX (V21, V23, Bell 103)
SM890	SmartModem 21/23	AD, AA, AX, AT, ASY	300 FDX, 1200/75 FDX (V21, V23, Bell 103)
SM891	SmartModem 21/23SA	AD, AA, AX, AT, SY/ASY	300 FDX, 1200/75 FDX, 1200 HDX (V21, V23, Bell 103)
SM870	SmartModem 1200A	AD, AA, AX, AT, ASY	1200 FDX, 300 FDX (V22, Bell 103)
SM872	SmartModem 1200SA	AD, AA, AX, AT, SY/ASY	1200 FDX, 300 FDX (V22, Bell 212A, Bell 103)
SM880	SmartModem 2400A	AD, AA, AX, AT, ASY	2400 FDX, 1200 FDX, 300 FDX (V22bis, V22, Bell 212A, Bell 103)
SM882	SmartModem 2400SA	AD, AA, AX, AT, SY/ASY	2400 FDX, 1200 FDX, 300 FDX (V22bis, V22, Bell 212A, Bell 103)
SM840	SmartModem 123A	AD, AA, AX, AT, AR, ASY	1200 FDX, 1200/75 FDX, 300 FDX (V22, V23, V21, Bell 212A, Bell 103)
SM842	SmartModem 123SA	AD, AA, AX, AT, AR, SY/ ASY	1200 FDX, 1200/75 FDX, 300 FDX (V22, V23, V21, Bell 212A, Bell 103)
SM845	SmartModem 1234A	AD, AA, AX, AT, AR, ASY	2400 FDX, 1200 FDX, 1200/75 FDX, 300 FDX (V22bis, V22, V23, V21, Bell 212A, Bell 103)
SM847	SmartModem 1234SA	AD, AA, AX, AT, AR, SY/ ASY	2400 FDX, 1200 FDX, 1200/75 FDX, 300 FDX (V22bis, V22, V23, V21, Bell 212A, Bell 103)
IN610	PC In/Modem	FI, AD, AA, AX, AT, ASY	300 FDX, 1200/75 FDX (V21, V23, Bell 103)
IN610	1200 In/ Modem	FI, AD, AA, AX, AT, ASY	1200 FDX, 300 FDX (V22, Bell 103)
IN615	2400 In/ Modem	FI, AD, AA, AX, AT, ASY	2400 FDX, 1200 FDX, 300 FDX (V22bis, V22, Bell 212A, Bell 103)
IN620	123 In/Modem	FI, AD, AA, AX, AT, AR, ASY	1200 FDX, 1200/75 FDX, 300 FDX (V22, V23, V21, Bell 212A, Bell 103)
IN625	1234 In/ Modem	FI, AD, AA, AX, AT, AR, ASY	2400 FDX, 1200 FDX, 1200/75 FDX, 300 FDX (V22bis, V22, V23, V21, Bell 212A, Bell 103)
TR100	TrailBlazer	10,000 bps Packetised Ensemble Modem; AD, AA, AD, AT, AR, ASY, EC, 2 wire PSTN	High Speed, 1200 FXX, 300 FDX (Adaptive Duplex, Bell 212A. Bell 103)
TR200	TrailBlazer PC	FI, as above	As above

LEGEND:

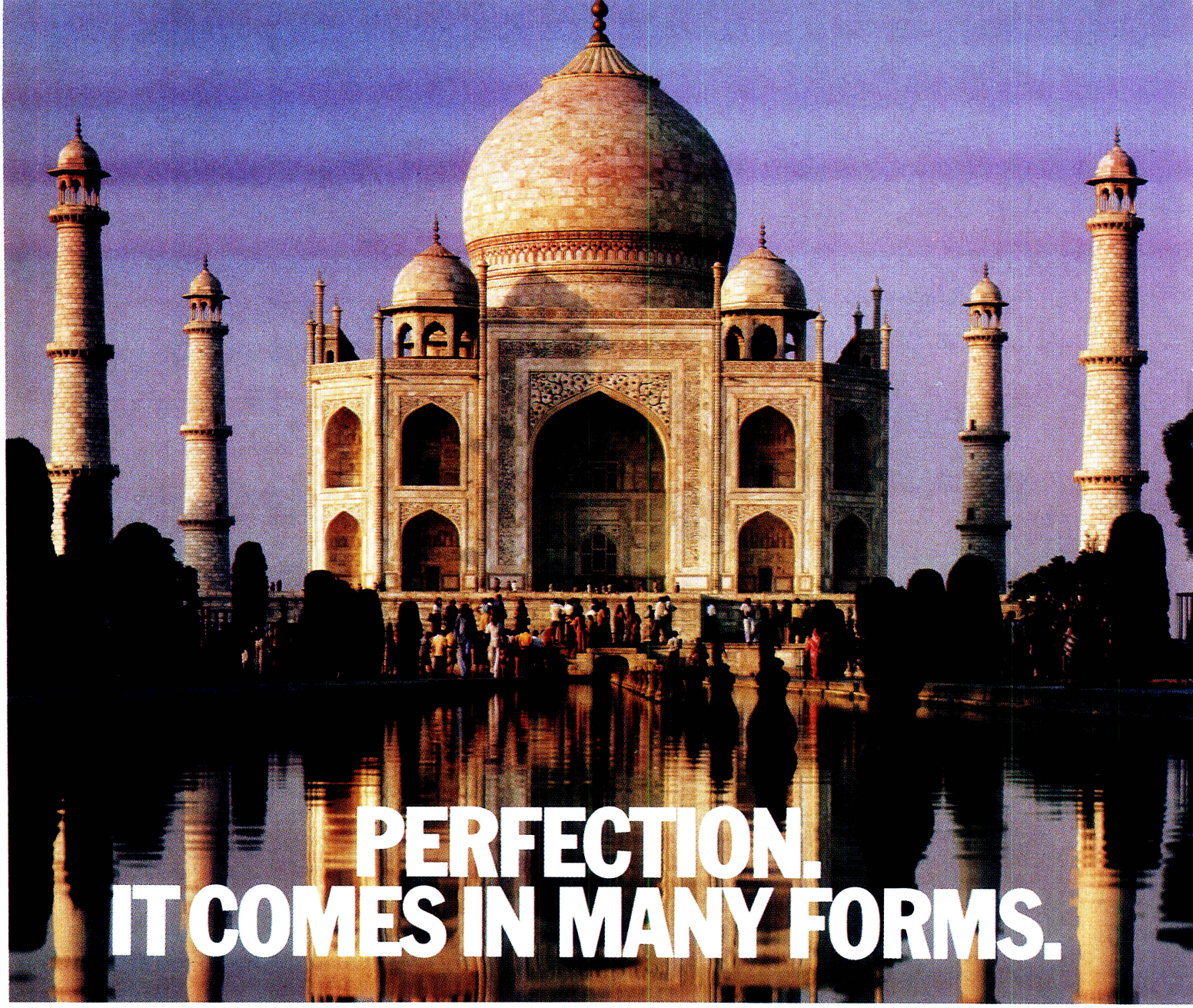
MD — Manual Dial	AR — Auto Ranging	ASY	— Asynchronous
MA — Manual Answer	AA — Auto Answer	SY/ASY	— Synchronous/Asynchronous
PD — Pulse Dial	AX — Auto Disconnect	FI	— Fully internal modem for IBM PC or Compatible
AD — Auto Dial	AT — "AT" Command Set		

NetComm

Total Solutions for Data Communications

NetComm (Aust) Pty Ltd • NSW PO Box 284 Pymble NSW 2073 Tel: (02) 888 5533
Telex: 7110712811 + (DNC002 DNCT) Minerva: 07:DNC002 Viatel: 288855330
VICTORIA Suite 4 6th Floor 520 Collins Street Melbourne 3000 Tel: (03) 618 5104
QUEENSLAND Suite 6 Level 11 AMP Place 10 Eagle Street Brisbane 4000
Tel: (07) 229 7376

NE21FPC



PERFECTION. IT COMES IN MANY FORMS.

At Nashua, we believe there should be only one standard in diskette manufacture. Perfection.

That's the standard we work to.

Every diskette is manufactured 100% error free, because at each stage of production our diskettes are "statistically control" checked, to make sure the quality is "built in," every step of the way.

Additionally, Nashua guarantees each diskette for life.

That's the kind of quality, consistency and guarantee you have to insist on in today's demanding computer world.

PERFECTION. THE ONLY STANDARD WE WORK TO.

Nashua Discs Direct Sales Centres.

New South Wales: 48 Frenchs Road, Willoughby 2068. Phone: (02) 958 2044. **Australian Capital Territory:** 71 Constitution Avenue, Campbell 2601. Phone: (062) 47 0511. **Victoria:** 523 Victoria Street, Abbotsford 3067. Phone: (03) 428 0501. **Queensland:** 1 Mayneview Street, Milton 4064. Phone: (07) 369 4244. **South Australia:** 31 The Parade, Norwood 5067. Phone: (08) 42 0021. **Western Australia:** 131 Summers Street, East Perth 6000. Phone: (09) 328 1888. **Tasmania:** 209 Murray Street, Hobart 7000. Phone: (002) 23 4377. **Northern Territory:** 8 Gardiner Street, Darwin 5790. Phone: (089) 81 6204. **New Zealand:** Auckland. Phone: 39 2454. **Papua New Guinea:** Phone: 25 6766. **Fiji:** Phone: 2 5195.

444 NA

Wang's AT in disguise

Rose Vines thought she'd well and truly shaken the dust of Your Computer off her heels when she headed into the sunset for mountains, deserts, and points north — but we wanted her to remember us and couldn't let her get away that easily. So as a parting gift we landed her with the latest Wang (an AT compatible in disguise) to evaluate.

The Computer Trader

Phone Order Specials
(03) 417-7044 (Reverse Charges)
we won't be beaten on PRICE!

SUPER TRADER SAVINGS

"No-one offers this Preferential Price & Performance Plan"

We call it 4P. It enables us to provide you with the convenience of your local computer shop and the technical support of a professional consultant.

Add up the benefits:

1. TRADE DISCOUNTS OF UP TO 35% ON R.R.P. – The Computer Trader purchases substantial volumes of hardware and software each month. *You benefit from our purchasing power by receiving the lowest prices available and first option on limited offer Supertrader Specials.*

2. FREE CATALOGUE – The countless hours spent each month in "shopping" for new products and in updating your knowledge can be minimised by 4P. On registering in 4P you indicate your hardware and software preferences and we prepare a catalogue tailored to your needs.

3. IMMEDIATE DELIVERY DOOR TO DOOR – If products are in stock we will have them delivered overnight to your door. A "rush" delivery fee is charged to non 4P members for this service.

4. MANUFACTURERS WARRANTY – All products supplied by The Computer Trader carry a full manufacturer's warranty. Any claims made against this warranty by 4P members will be followed up by The Computer Trader provided the terms of the warranty have been complied with.

5. THE COMPUTER TRADER 30 DAY MONEY BACK GUARANTEE – As a 4P member we will refund your money on any purchase from The Computer Trader which does not comply with the manufacturer's published specifications regardless of whether or not the default is covered by the manufacturer's warranty.

6. FREE INFORMATION SERVICE – In addition to our free catalogue 4P members receive regular bulletins on newly released products, special buys that become available and other items of interest that may not be published in the Australian press.

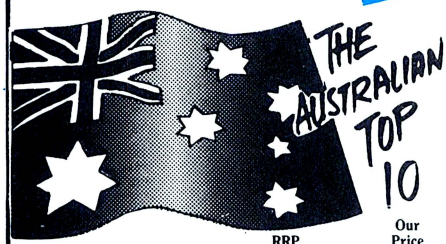
7. LOCAL & OVERSEAS BUYING SERVICE – If we do not already have the product you require, our experienced consultants will trace it for you–either locally or overseas.

8. CORPORATE ACCOUNT PROGRAMME – More than 50% of our clients are corporate or government organisations. The Computer Trader will supply these organisations on a purchase order basis provided they comply with our payment terms.

9. QUANTITY DISCOUNTS – The Computer Trader will offer additional discounts for volume purchases.

10. Software rentals for 4P members only–on application.

11. FREE TECHNICAL SUPPORT– We have retained the services of a team of highly qualified and independent micro computer consultants who are available to answer technical queries on all products purchased from The Computer Trader. *Their support is available on our special hotline free of charge to 4P members.*



		RRP	Our Price
1.	Lotus 1-2-3	835	535
2.	Multimate	745	439
3.	Open Access	995	665
4.	Symphony	1095	725
5.	Multiplan	365	295
6.	Microsoft Word	595	465
7.	Wordstar	445	340
8.	dBase III	976	645
9.	Attache	775 p.m.	CALL
10.	Dataflex	N.A.	CALL

Courtesy PC Australia

TOP SYSTEMS

	List Price	Our Price
1. IBM PC "XT" 10Mb, FDD & 256K, (Colour +425)	6252	4845
2. Olivetti M24 "XT" 10Mb, FDD, 256K (Colour +625)	6522	4595
3. IBM Compatible It's got everything incl. 10Mb & 512K.. NOTE: Add $300 for 20Mb and from $200 for 256K RAM.	N/A	2985

HARDWARE

Printers	*NEC – P2/P3 Pinwriter (Colour + 225)	850/1195
	*NEC-P5 Pinwriter	CALL
	*Epson – LX80	415
	Colour Printers & Plotters	CALL
	NEC – Spinwriter E.L.F.	695
	Epson–FX85 (FX105 $995)	775
	Brother new models	CALL
	C-Itoh, Toshiba, Silver-Reed & others	CALL
Monitors	*Taxan Hi Res. Vision III Colour	650
	Taxan Hi. Res. Amber or Green	249
	BMC Composite	159
	Other Brands	CALL
Disk Drives	*Hard disk 10Mb internal	from 1250
	*Hard disk 20Mb internal	from 1495
	Slimline Floppy – 360K direct drive .	285
	Floppy Drive – 360K	250
	Hard disk greater than 20Mb	CALL
All quality brands: Tandon, Tallgrass, Rodime NEC & Seagate.		
Tape Back-up	*Cipher 32 Mb internal	1695
	Sysgen 10 Mb	1595
Boards	*Multifunction Card	from 295
	*Colour/Graphics Card	285
	*Mono/Graphics Card	325
	Persyst, Sigma, Orchid, Qubie, & Paradise – excellent prices	CALL
Modems	PC In-Modem 1200/75	685
	Viatel Modem	CALL
	Sendata/Netcom	CALL
Floppy Disks	*Nashua DSDD	39
	*Top Quality Brand DSDD	25
	Disk storage unit (90 disks)	22
	Other Brands and Sizes	CALL

SOFTWARE – MACINTOSH

Business	Omnis 3	565
	Jazz	665
	Thinktank	255
	Microsoft	CALL
	Other	CALL
Entertainment	Baron	69
	Millionaire	69
	Zork II/III	59

SOFTWARE – IBM

Spreadsheets	*Lotus 1-2-3	535
Integrated	*Symphony (Vers 1.1)	725
	Enable	765
	Framework	750
	Multiplan	285
	Open Access	665
	Supercalc. 3	399
Database	*dBASE III	645
	*Versaform	199
	Knowledgeman	580
	Quickcode III	325
Word Processing	*Wordstar	340
	*Multimate (advantage+80)	439
	Perfect Writer II	295
	Wordperfect	439
	Microsoft Word and Spell	495
Languages	*DeSmet C	195
	Turbo Pascal (toolbox +62)	79
	*Borland Int. (Turbo)	CALL
	Digital Research	CALL
	Microsoft	CALL
Utilities & other	*dTOOLKIT	99
	*Typequick	69
	*Smartkey	69
	Superkey	72
	Thinktank	215
	Sideways	79
	Norton Utilities (Ver 3.0)	145
	Copywrite/Disk Explorer	95
	Sidekick	89
	GEM incl. desktop and drawer	CALL
	Eightymate (runs CPM80 prog. under MS-DOS)	295
	PC Alien	89
	All others	CALL
Communications	*Crosstalk	175
	*Smarterm 100 (DEC Emulator)	250
	*Smarterm 400 (D.G. Emulator)	250
Entertainment	Flight Simulator	95
	Sargon III	65
	All Others	CALL
Accounting	Integrated–Drs/Crs/GL/etc.	CALL
	Information–Business Manager1	385
	Information–Payroll	299
	Integrity–Accounting one	595
	Integrity–Payroll	495
	CPA+	680
	Sybiz	CALL
	IAL	CALL
	Vertical Market	CALL
Project Management	*Timeline	485
	Harvard Project Management	495
	Microsoft Project	545

*SUPERTRADER SPECIALS

NO MORE WORRIES
with our free HOTLINE SUPPORT

ANY PRODUCTS NOT LISTED – CALL, CALL, CALL!

BANKCARD & VISA CARD ACCEPTED – TERMS: PAYMENT ON RECEIPT OF GOODS

MANUFACTURERS' WARRANTY ON ALL PRODUCTS

Handling charges $7.50 on all software, boards and accessories. In the unlikely event that our costs change without notice we reserve the right to alter prices.

The Computer Trader
98 Hoddle St., Abbotsford 3067 ☎ (03) 417 7044

ADVANCED WANG

REVIEWING THE Wang Advanced Professional Computer was one of my going-away presents from *Your Computer*. Just when I thought I'd made good my escape from the Federal Publishing compound, Natalie (my esteemed ex-editor) reared up at the car window, brandishing my distributor's rotor arm and offering to exchange it for a teensy review.

Unable to resist, I loaded the seven cartons and assorted bits and pieces into the back of my truck and headed home. Home, in my present state of almost-not-here, consists of shared living space and a two-metre-by-two-metre box I call my own. Rather than set the Wang up in my own space (and be forced to sleep standing up), I conned some floor space from a friend with a loft bed, and started working with myself and the Wang ensconced beneath it.

Understandably, I felt a little uneasy about working under a bed — with the worry that at any moment the Wang and I would be crushed to a pulp — but I don't think this accounts for my complete unease when setting up and using the computer. The process was akin to finding one's way through a maze, and for a while I had visions of myself being engaged in a loft-bed version of Dungeons and Dragons. To put it mildly, getting started was a chore.

Setting Up

The various cartons containing the hardware and software included the system electronics unit (containing drives and assorted boards), a monochrome monitor, a monitor arm, a keyboard, a Wang serial printer, the IBM Emulation Option kit and the printer installation kit. Over a dozen manuals, booklets and reference cards accompanied the computer (together with a brace of 'Readme' files), and finding my way around all these wasn't easy. The manuals each contain a flowchart telling you in which order to read them, but the booklet which said "APC users read this first" wasn't included in the flowchart, and the so-called 'installation guide' was in fact a series of small leaflets scattered throughout the various boxes.

The owner of the loft bed had expressed a desire to learn a little about computers, so I went through the setting-up procedure with her by my side. It was certainly an education — taking us back into the microcomputing dark ages, when everything was designed to be obscure, and you could prove your credentials merely by getting a machine running. Enough to put a beginner off before you've even started using the damn machine.

Installation includes taking the cover off the electronics unit and checking boards and switches. A set of screwdrivers is provided with the computer — a nice touch, except the screwdrivers appear to be made of putty — and the procedure is simple, apart from having to heave the unit onto its side. Connecting the keyboard, monitor and printer is straightforward, and then all that remains to be done is to install the software.

'*All that remains to be done*' . . . Hah! Installing the software ended up taking almost a full day, due to various major and minor frustrations. My first problem was that the disks were unreadable for some reason; fortunately Wang responded promptly with a new set of disks, which worked fine. One word of warning to the experienced — Wang disks are labelled down the side of the disk (because the disk drives are set up vertically), so you have to watch how you place them in the drive, especially if you then use them on another computer with the usual horizontal drive configuration.

The Install utility takes you through the installation process. It's not always clear what responses are required to the various prompts, but it does automate the job of copying large numbers of files from your floppy disk drives to the hard disk, and setting up various default directories for different applications. It also creates a menu system which may be used as an alternative to learning and using MS-DOS commands. If you want to use the IBM emulation mode, you need to replace some of the Wang keycaps with the IBM keys supplied.

Most of the minor frustrations in installing the software were due to the lack of clarity in Wang's system utilities. I'd describe the Install programs, menu system and Tutor program as examples of lazy programming. They do a really good job — up to a point — and then fail to be explicit in their directions. For new users (I tested a couple of them on the machine), these programs leave a lot to be desired. The menu system in particular — meant to be an easy alternative to DOS — is sometimes so cryptic it's almost useless; it'd take you less time to learn DOS. It isn't all bad, but my first impressions were less than favourable.

The manuals themselves are so-so: they're certainly well presented and the information is accurate, but they jump into jargon quite suddenly at times, and at others they skimp a bit on details. It's good to have the quick-reference guides, especially the BASIC language guide, but the tutor is fairly limited and adopts the seemingly standard condescending tone. I think the need for a flowchart to tell you how to read the manuals indicates that Wang should reorganise and simplify the information it provides with the system.

Applications Software

The review system was supplied with MS-DOS Version 2.11a, the Wang Utilities and Tutor, a RAMdisk utility, Multiplan, Advanced Wang Word Processing and IBM PC Emulation software. Applications for the Wang fall into three categories: core applications, written and supported by Wang; distributed applications, written by other companies and sold by Wang; and referenced applications, developed and supplied through other companies, but acknowledged by Wang to run on the APC.

The core applications consist of six programs which cover the major areas of software use, such as word processing, spreadsheets and databases. For people already familiar with Wang software, these programs should cover most of their needs. If you intend doing any heavy-duty work in a specific applications area, or if you're used to other programs, you will probably wish to buy non-Wang software.

I originally intended to test the APC solely using software I've tried and tested on other machines. However, I had to wait around for the IBM Emulation Kit to appear, so I decided to try Advanced Wang Word Processing to see how it shaped up. On the whole, it's very good. As Wang's reputation is based largely on its word processors, I expected quite a lot and wasn't disappointed.

I didn't have time to test its advanced features; instead, I tried to achieve as much as possible without consulting the manuals (mainly as I was pushed for time to review the machine). The fact you're reading this article shows it was pretty easy to get satisfactory results without the guidebook. Whenever I hit a snag, I hit the HELP button (I eventually found SHIFT HELP, which gives a list of available help topics). I could work out most of the commands myself, because the keyboard is specifically set up for word processing. ▶

The Advanced Wang Word Processing software is on the whole very good. As Wang's reputation is based largely on its word processors, I expected quite a lot and wasn't disappointed.

with the keytops labelled with commands such as Center (Wang's spelling), Merge, Go To, Srch and Copy.

The only things I didn't like were the commands for moving around a document (you have to press the Go To key in combination with other keys which are located a fair way away from it), and the really slack way the program dumps you back to DOS without clearing the screen, leaving your cursor stuck in the middle of the word processing menu. The latter may be merely a quibble, but it's yet another example of the lazy programming standards adopted by Wang.

The RAMdisk utility allows you to set aside some of your internal memory as a RAM (random access memory) drive. A RAM drive provides very fast access times; however, information will be lost when the power is turned off, so any files you need to keep must be copied to floppy or Winchester disks before you turn the machine off. The Wang utility lets you use either a fixed amount of memory for the drive (say, 256 Kbytes) or a fixed proportion of available memory (such as 60 per cent).

As with NEC's APC III, IBM compatibility is an option. To run IBM software, you need the appropriate board (the review machine came with the standard Wang IBM monochrome board), keycaps to convert the keyboard to the familiar IBM landscape, and a function strip to label the function keys and emulation software. From DOS, you issue the command LOADIBM (with appropriate parameters to describe your printer and disk drives), and then load your PC-DOS system disk to enter IBM PC mode.

The APC is basically equivalent to IBM's AT, with an Intel 80286 processor running at 8 MHz; this means it runs IBM software much faster than the IBM PC itself. The list of software the APC runs in IBM mode is quite impressive, and I had no problems with Flight Simulator, Wordstar and Lotus 1-2-3. I didn't have a copy of dBase III with me (and it's not included in Wang's list of usable IBM PC software, so dBase III users beware), but I tested dBase II in normal Wang mode. The main problem with using the Wang in IBM mode is that some programs are adversely influenced by the faster clock speed of the 80286, and there's no way of running anything at IBM's 4.77 MHz.

If you're mainly interested in IBM compatibility, I doubt the Wang would even make your shortlist. Wang itself wasn't interested when we did our review of the IBM AT clones — the company seems to regard IBM compatibility as a necessary evil, which is better left unmentioned. It's there, but it is not the focus of the machine.

Let's Get Physical

I've concentrated on the software first, as it's the most important requirement when buying a computer — if it won't run the software you need to get a job done, then it doesn't matter how fancy the machinery is.

The Wang's machinery is pretty fancy. Like all 80286-based machines I've tried, it runs like lightning and is a joy to watch in action. I'm sure in another year or two I'll regard these machines as loafers and swear at their slothfulness, but for now, an 80286 is fun.

Packed into the electronics unit, along with the main processor, is a standard 512 Kbytes of main memory, expandable to 2 Mbytes, using Wang's own 256 Kbyte SIMM chips. The APC comes with either five or eight expansion slots, and the review unit had one 1.2 Mbyte floppy disk drive and a 30 Mbyte Winchester hard drive. A slip of paper with the system said it was supposed to have a 20 Mbyte Winchester, but they'd run out of them and were supplying the 30 Mbyte drive at no extra cost — a pleasant surprise for some purchasers. A serial and a parallel port are also fitted.

The electronics unit is easy to pull apart (if you need to install option cards, add memory or check switches or connections), but a little unwieldy to turn on its end and pull the case off.

As mentioned before, the monitor comes complete with a monitor arm, so you can adjust its position and move it out of the way when you're doing other work at your desk.

The keyboard is set out with separate sections for the main keyboard, cursor and command keys, a numeric keypad and a strip of function keys along the top. Removable function-key label strips are supplied, and the keyboard has legs to provide two different typing positions. Software is provided to adjust the sound level of the key click. I found the feel good, and was generally impressed. My only quibbles were the positioning of the Go To key for word processing, and of the Control key beside the space bar — it makes scrolling commands such as Control S very difficult.

The system was accompanied by a Wang 40-characters-per-second daisy-wheel printer and installation software. The printer was easy to set up, worked well, and made me particularly glad there was no-one occupying the loft bed when I tested it, as it's a noisy beast.

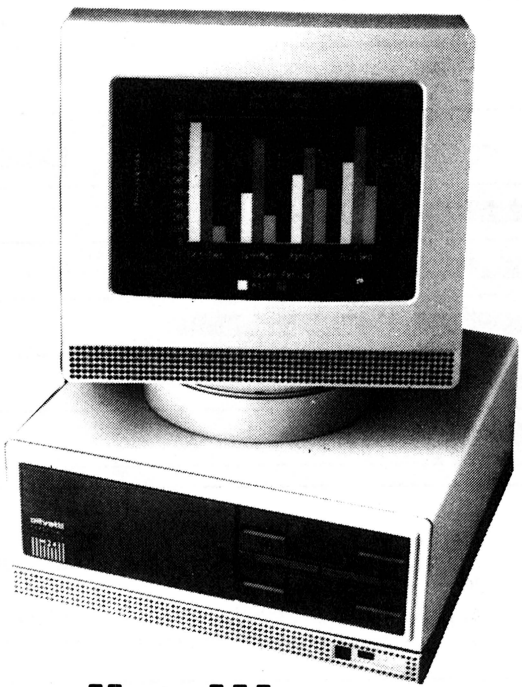
Apart from when using the printer, one thing which took me a while to notice about the APC is the absence of noise. I worked with the electronics unit at my elbow, and it was delightfully quiet. All in all, the hardware is well made and well put together, and I had no trouble with it.

Who'd Wanna Wang?

After recovering from my trials with installing the Wang and the mania with the manuals, I enjoyed using the system. Steering well clear of the menu system, I found it fast and reliable, and the software provided a consistent interface.

However, Wang has produced a computer which is really suited only for current Wang users. If you're brand new to computing, the manuals, instruction material and menu system are not good enough to provide an introduction. The

Can't decide?



olivetti

NEC APC III

Both these machines run industry standard software at nearly twice the speed of other compatibles, and each manufacturer provides solid back-up support throughout Australia. So if you're having trouble deciding, why not phone A.T.S. COMPUTING for unbiased advice? If you can't make it to our Sydney or Melbourne showrooms speak to Doug Cotton on (02) 858-5999 about our interstate and country services. The following are just some of the many packages we can tailor to your needs:—

NEC APCIII with dual 720K drives, 640K RAM, SLE card (for compatibility), high speed Near Letter Quality (NLQ) printer and cable, PLUS A.T.S. Practice System (the fastest running, and perhaps fastest selling Medical, Dental and Professional package) OR Enable (integrated word processing, spread sheet, database, graphics and communications) and S.B.A. software (debtors, creditors, general ledger, stock) — $4,995 incl. tax.

OLIVETTI M24 with dual 360K drives, 640K RAM and NEC P2 180 c.p.s. NLQ printer, bi-directional tractor and cable PLUS S.B.A. software (as above) — $4,995 incl. tax.

NEC APCIII 10 Megabyte system with 640K RAM, SLE card and wide carriage 180 c.p.s. NLQ printer, bi-directional tractor and cable (all covered by 12 month warranty) PLUS A.T.S. Practice System OR Enable and S.B.A. software (as above) — $6,840 incl. tax.

OLIVETTI M24 with 20 Megabyte Tandon drive, 640K RAM and NEC P3 wide carriage 180 c.p.s. NLQ printer, bi-directional tractor and cable, PLUS Enable software — $6,995 incl. tax.

All systems include keyboard and manufacturer's monochrome monitor. Add $700 for NEC colour or $800 for Olivetti colour in lieu of mono.

Phone for great discounts on top quality printers, modems, expansion cards, co-processors, disc drives, software etc. Super Special: Tandon 20 Meg drive with controller and cables $1,225 incl. tax.

SYDNEY: Phone (02) 858 5999
1039a Victoria Rd., West Ryde 2114

MELBOURNE: Phone (03) 690 9196
7th Flr, 96 Albert Rd., South Melbourne

All mail orders and other State enquiries to Sydney office.

A.T.S. COMPUTING

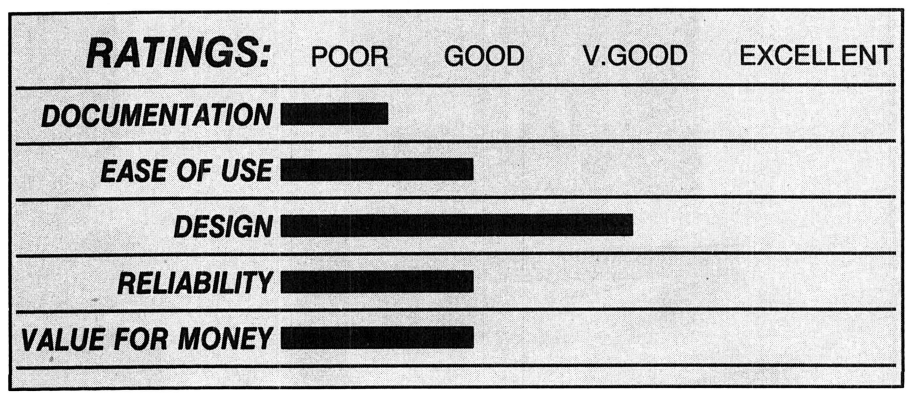
"Advanced Technology + Service"

menu system could be improved by showing you the equivalent DOS command which would do the same chore for you; instead you're locked into an inadequate aid.

If you want to buy an IBM AT compatible, look elsewhere. Other computers do the job with less hassle and a higher degree of compatibility. If you're not sure which computer you want (although anyone buying a computer at this end of the market should have some idea), you'd still do better to opt for an IBM-compatible box, or something like the NEC APC III, which has loads of support and software.

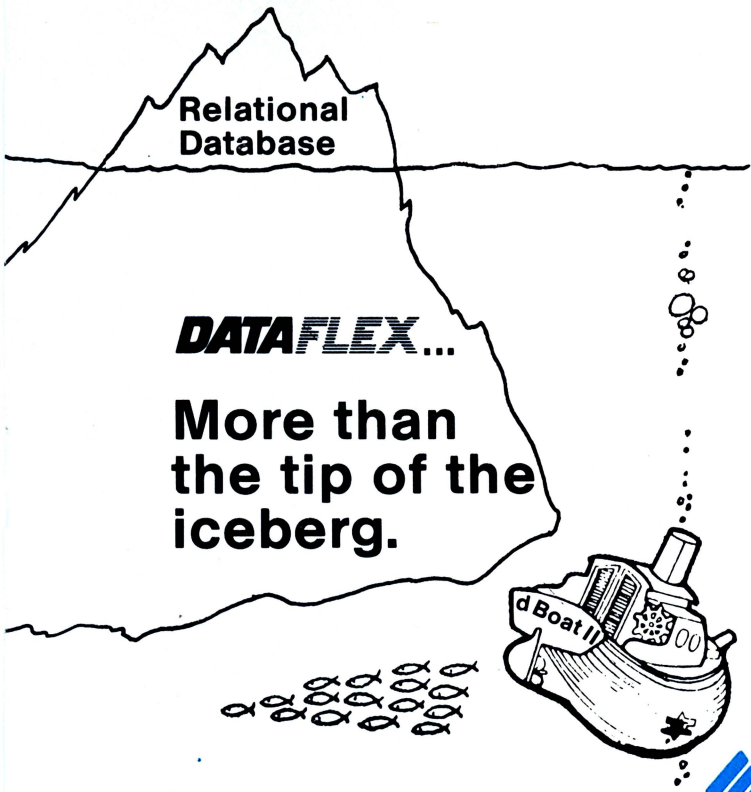
If you have already used Wang equipment and software, or if you need to connect with other Wang machines, the APC will be a good investment. It provides you with Wang compatibility (including a utility for converting Wang PC files), speed, reliability and a degree of IBM compatibility if you're feeling so inclined. All in all, it's a good machine, with a restricted market. □

PRODUCT DETAILS



Supplier: Wang Computer, 168 Walker Street, North Sydney 2060; (02) 925 5678.

Price: Approximately $11,000 incl. sales tax; $12,000 with Wang 40 cps daisywheel serial printer (incl. sales tax).



DATAFLEX 2.1™

NOW FOR XENIX AND DOS 3.1

Simply stated ... the industry's most powerful application development software is also the easiest to use.

AVAILABLE ON: CP/M, CP/M-86, MP/M-86, MS-DOS, PC-DOS, Molecular N-Star, Televideo Mmmost, Omninet, TurboDOS, Novell ShareNet, PC-Net, DMS Hinet, IBM 'PC' w/Corvus, OSM Muse. 3-COM, CCP/M-86, M/NET, DAVONG, X-NET
Ask us about our training courses

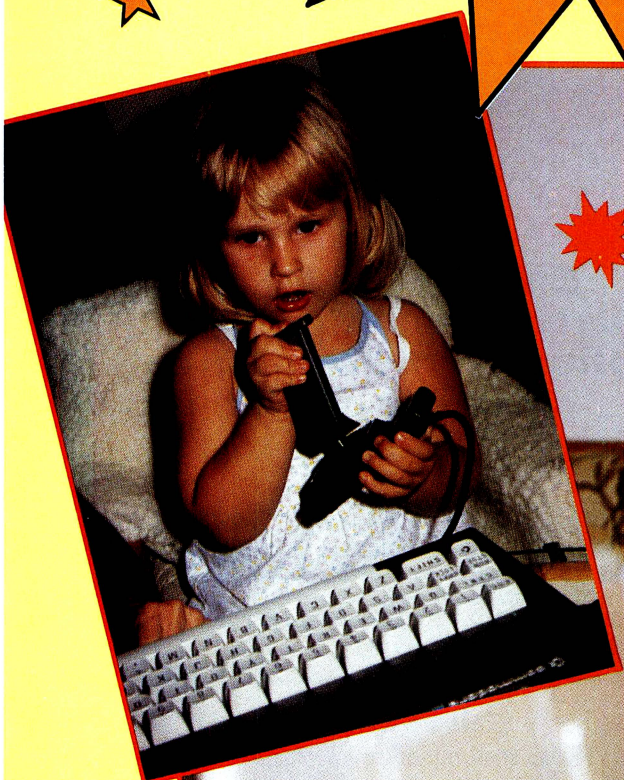
AUSTRALIAN MICROCOMPUTER SOLUTIONS
CURRABEG HOUSE
248 LATROBE TCE., GEELONG 3220
Telephone (052) 211-085 (052) 211-300

DEALER ENQUIRIES WELCOME
Please send me more information on Dataflex

AMS AUST

Name .....
Address .....
.....
Postcode ..... Telephone .....

CHEAP AND BLAST!!



You want a cheap computer for the kids? You're not the only one, judging by the calls we get every week, begging for our verdict on the best of the baby bunch. Well, if you're looking for the machine the kids like, you might as well start with games. Zap! Pow! Bam! Zoooooommm! are their units of measurement, so we put together a team of space-helmeted judges to answer the question for you. Natalie Filatoff was there to report on the battle . . .

What's the state of play at your place? Have you yet to succumb to the "I wanna pewta" spiel? Are you weakening at the thought of being able to send the whole gaggle of squealing squirts off with the pixels? Perhaps you've always been drawn by the arcade game ambience yourself: the 20-cent gladiators heroically grappling the controls; present and future fifteen-car-pile-up perpetrators spinning their (steering) wheels in pot-luck attempts to move low-res Lamborghinis onto the racetrack; queues of Weight Watchers weighting to relieve their frustrations on a game of Pacman — gobble gobble?

We suspect most of the suspiciously casual or bored-sounding parents who ring us for advice on what kind of 'cheap' computer to buy their kids are anxious to get their own feverish fingers on a joystick — "Peeyow! Nyuk, nyuk, nyuk". Come on, why play it down? Not even the great Yogi Kapor would try to suggest that sitting in the Lotus 1-2-3 position is good for tension relief. On the other hand, 3D-Boxing on the Amstrad could stop you taking it out on your staff/family.

Whatever the justification, computer games can be entertaining, fantastic, absorbing, fun . . . and they're great for developing hand-to-eye co-ordination. What's more, you can buy a 'games' computer for as little as $99.

You can. Of course, a computer at that price has to express itself through your television set — "Boop-boop. Boiyoiyoing." And it doesn't come with a joystick, or the games themselves.

How cheaply can you buy a whizz-bang games computer, we at *Your Computer* wondered, and which of the least expensive machines is best for playing games, in what way, and in what configuration?

The Judging Panel

A judging panel? Shades of PC *Of The Year* . . . Well, a playoff seemed the best means of satisfying our/your curiosity, and we thought we'd balance our own professional impartiality, our journalistic objectivity, with an evaluation by a totally subjective-thinking panel of distinguished judges: Lauren (aged 2 1/2), Pierre (7), Jodie (8), Kurt (8), Jason (10), Justin (11), Paul (11) and Byron (11).

We got clearance with Matt's neighbours to do the testing at his house on Easter Saturday. The five cheapest machines we could find arrived on the preceding Thursday. They were the Dick Smith VZ300 ($99), the Commodore 16 ($159), the Tandy TRS-80 Colour Computer 2 ($299), the John Sands Sega SC3000 ($329) and the Amstrad CPC464 ($525). The prices shown are what we'll call the 'before' prices; they were the prices quoted on the phone when we were scouting around for playoff contenders. ▶

PROFOUND

THE TRULY IBM PC/XT COMPATIBLE

Announcing the opening of our Sydney store.

Dealer enquiries are welcome.

IBM SOFTWARE	OUR PRICE	RRP
LOTUS 1-2-3 VERS 2	535	835
SYMPHONY	725	1095
DBASE 2	495	678
DBASE 3+	795	995
PARADOX	795	995
PFS FILE	195	215
PFS PLAN	195	215
PFS REPORT	195	215
PFS GRAPH	195	215
PFS WRITE	195	215
AUDITOR VERSION 2	195	215
BOTTOMLINE IV	295	365
SPOTLIGHT	195	235
SIDEWAYS	85	95
STARBRIDGE	65	70
SIDEKICK (UNPROTECTED)	125	135
THINK TANK	250	295
TURBO PASCAL	99	119
TURBO PASCAL 8087	160	180
TURBO TUTOR	60	65
TURBO TOOLBOX	80	90
DATABASE TOOLBOX	90	99
TURBO LIGHTENING	130	145
QUICKCODE II	365	405
DUTIL III	135	145
QUICK REPORT III	365	405
WORDSTAR	340	445
WORDSTAR 2000 VER 2	455	595
WORDSTAR 200 PLUS	545	695

PR-02 PROFOUND STANDARD

* 256K RAM
* 8 SLOT MOTHERBOARD
* VIDEO BOARD
* PARALLEL PRINTER PORT
* SERIAL PORT RS-232
* REAL TIME CLOCK/CAL.
* JOYSTICK PORT
* 2 x 360K FLOPPY DRIVES
  Add $150.00 for 640K Ram

$1,499

THE SPECIAL

* PR-02 COMPUTER WITH 640K RAM
* PHOENIX IV 14" COLOUR MONITOR
* STAR SG 15" PRINTER WITH CABLE
* 20 MEG SLIMLINE HARD DISC
* WITH ABOVE SPECIAL PACKAGE FOR ONLY AN EXTRA $200.00 YOU GET KER II LOTUS 123

$4,499

HARD DISKS

— 10 MBYTE & CONTROLLER $950
— 20 MBYTE & CONTROLLER $1250

MONITORS

— COMPOSITE HI-RES GR OR AM $199
— MONOCHROME HI RES G OR A $299
— INTRA 14" COLOR HI-RES. $690
— PHOENIX IV 14" COLOR $790
— DTx14 COLOUR $499

PRINTERS

— BROTHER M-1109 80 COL $399
— BROTHER M-1509 132 COL $799
— TWINWRITER 5 DUAL-HEAD $1995
— NAKAJIMA NP-2200 165 CPS $599
— NAKAJIMA AP-650 D/WHEEL $650
— OLYMIA 165 ..... $599

OTHER

— MICROSOFT MOUSE $250
— Z-NIX MOUSE $160
— INTERLINK 12/75 MODEMS $299
— IBM COMPATIBLE JOYSTICK $50
— 10 BLANK DISKETTES DSDD $35
— DISK STORAGE BOX $25
— PRINTER CABLE $35
— PRINTER PAPER 80 COL 500 ..... $17

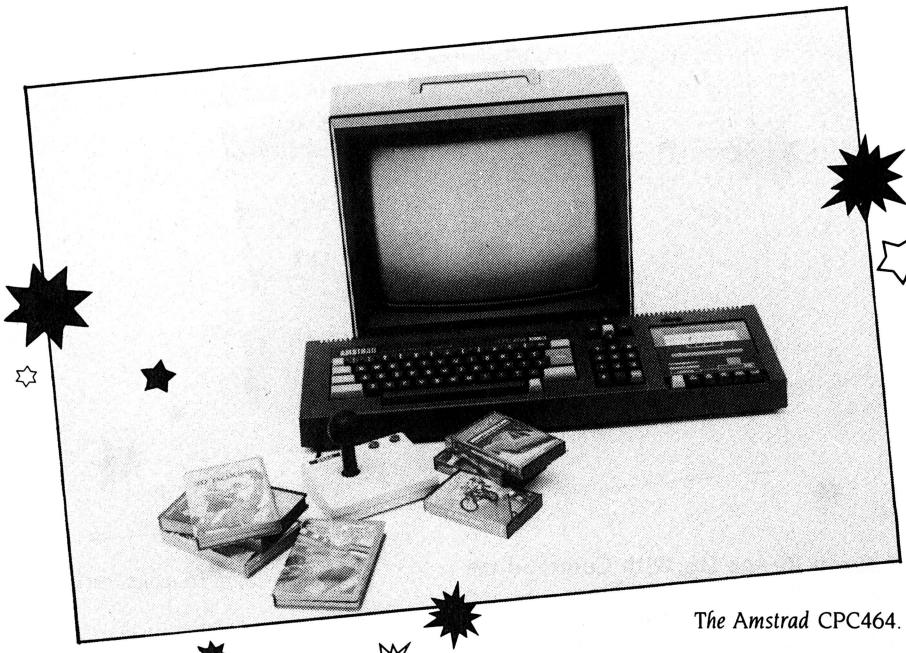
All Systems backed by:
● COMPREHENSIVE WARRANTY ● TECHNICAL SUPPORT ● FRIENDLY SERVICE

EME

EASTERN MICRO ELECTRONICS

MELBOURNE OFFICE
92-94 Bank Street
Sth. Melbourne 3205
Tel: (03) 699 3088

SYDNEY OFFICE
Gnd Floor, Fortune House
88 Foreaux Street
Surry Hills, N.S.W. Tel: (02) 212 6944



The Amstrad CPC464.

"Zzzoink!" came the protest from Matt's house as we pulled up outside on the afternoon of March 29. We decided to park a little further down the road. "Beepbarpboing," effused the dwelling as we knocked gingerly on the door. The conscientious judges had started early . . .

The screens of two of the computers stood out immediately: one was that of Matt's NEC colour TV which was translating for the Sega at the time; the other belonged to the Amstrad. Wow! Edwin (not his real name), my usually mature 23-year-old companion, rapidly regressed to the mental age of nine and volunteered to join the judging panel. The playoff had begun.

Although we'd asked manufacturers to supply suitable monitors, the Sega wasn't the only machine wired to a Whelan television. The Commodore 16 was forced to ally itself with a tiny 15 cm colour portable; to avoid this turning into an unfair disadvantage, we swapped things around later. Unfortunately, the VZ300 was supplied with an RGB monitor which didn't match it, so it never got going at all. As a standby, we'd also asked for a Dick Smith Cat which, at $499, met the cheap requirement, and could have rounded out the five, but it was supplied without a disk controller. Foiled again.

The judges hardly noticed. "I can beat Byron in this one" . . . "Go on, press a button" . . . "Dad, Kurt landed" . . . "*There's an* ELEPHANT *in the* CAR" (the Sega was amaze with Safari Hunting) . . . "I can jump 20 buses" (followed by 'Neeeeoowww, smash, crackle' as the 3D Stunt Rider landed on his head and the Amstrad burnt him to a crisp) . . . "Wipe your hands after the Cheezels — don't get bits in the keyboard!" It wasn't long before the youngest judge was singing "Ooo ee, ooo ee, ooo ee" to the Congo Bongo beat. "There's only one person can get up the top near that griller (read 'gorilla')" . . . "What is this game we couldn't play?" — the BASIC cartridge.

Mummy, Mummy, It's My Turn!

It was hard for the big kids to get a shot in edgewise. You'd spend 12 minutes loading some fascinating pixel production, and one of the judges would come and claim his or her rightful place as tester. Matt did 'get a go' at being a squat insect whose aim was to jump from piles of boxes onto other squat insects, in the Commodore game Jack Attack. And when Edwin told his smaller colleagues to "Rack off, it's my turn", they usually deferred on the basis of his size.

Having to load programs from cassette is a hazard of games machines (sure, you can have disk drives, but that can push the overall cost of a system beyond the realm of games). In their cheapest form, all the machines are cassette-based, but the ▶

The Commodore 16 games pack.

Sega, Commodore and Tandy models accept ROM cartridges, the favoured media for arcade gaming. Our test Sega and Tandy came with an impressive array of cartridges, but the Commodore had only one. All the software for the Amstrad was on tape (the Amstrad's cassette drive is built in to an impressive black keyboard), and games took up to 15 minutes to load. This wasn't a problem for the judges, only because the Amstrad seemed to have such enticing games that they were prepared to wait, but loading from tape on the Commodore didn't keep their enthusiasm going for long.

Each computer was supplied with a joystick, but only with the Commodore is it included in the basic package, as purchased.

So, which computer did most of the judges go home and ask their parents for? Five out of our panel of nine dreamt about the Amstrad that night — despite the long tape-loading procedures, the Amstrad was said to have the best graphics, the best use of colour and, most importantly, the best (and hardest) games. A certain amount of this machine's popularity might also be attributed to its appearance — its flashy, black, Darth Vader casing and colour-coded keys give the impression that it could annihilate any opponent. Three judges, including the honorary child, voted for the Sega — one because you could plug the games in and go, another because he thought the Sega had a good variety of games, and the other because he found the Sega's games were really his forte.

Lauren Keeps Up With Commodore

Lauren liked the Commodore and the Commodore only, because it was on a table of convenient height and she found its joystick easiest to use.

Except for Pierre, anyone who had the Amstrad as their first preference placed the Sega second, and vice versa. Pierre put the Tandy second because he liked the game Pooyan. Otherwise Tandy took out three third places and four fourths. It suffered mainly in that, although it was supplied with a Tandy colour television, the games made little, if any, use of colour — standing beside the Amstrad, it looked dull. The fact that it came mostly with games recommended for children aged three to eight also went against it — no self-respecting judge (even of age seven) would touch a game that might be suitable for a three-year-old. Those Tandy programs which didn't specify age were quite popular and reasonably fast-moving.

John Sands' Sega SC3000.

Aside from Lauren's first, the Commodore scored four thirds and four fourths. Its use of colour was appreciated (especially when played on the larger TV), but its games were termed "the worst", or "too babyish", which might be interpreted to mean that they had no 'depth' and quickly became boring.

Before you protest that the above ratings were made mainly on the strength of the kinds of games each machine offered, we should point out that a machine's capabilities dictate the sophistication and overall quality of the games which can be produced for it. The judges' ratings bore this out, in that the Amstrad has 64 Kbytes of available memory, the Sega has 32 Kbytes, and the Tandy and Commodore both have 16 Kbytes. Another piece of evidence supporting this assertion was that Jodie, who initially voted the Sega as first because it was quicker to load than the Amstrad, had the rest of the weekend to play with both machines, and eventually came to like the Amstrad best because the games held her interest longer.

The After Maths

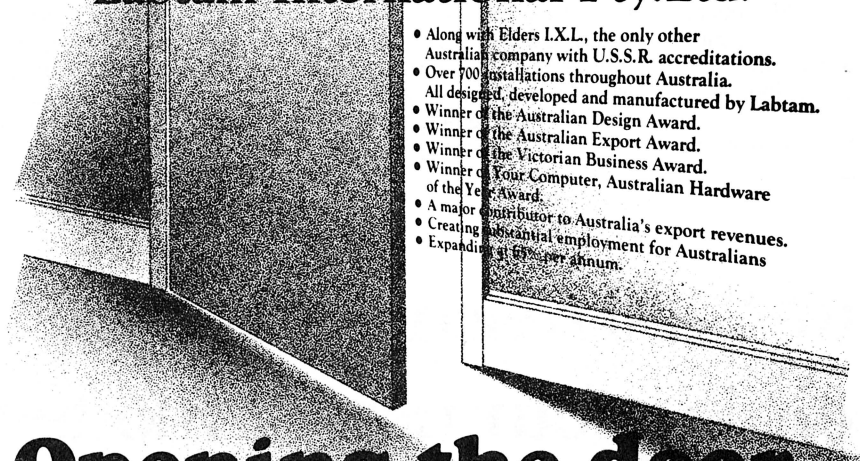
So, for sheer playability, the Amstrad was clearly tops . . . but let's look at value for money, and consider the 'after' (after you buy all the things you really need) prices.

The basic Amstrad package, which includes a green-screen monitor (not our breathtaking colour model) and the 64 Kbyte computer/keyboard with built-in cassette drive, costs $525. Add a joystick at $19.95 and one average-priced game, ▶

Yes

there is a wholly owned Australian Computer Company

Competing successfully against multi national Computer companies in the sales of Multi-User, Multi-Tasking 16 Bit C DOS™ 32 Bit Unix™ Computers. The Company is of course Labtam International Pty.Ltd.



- Along with Elders I.X.L., the only other Australian company with U.S.S.R. accreditations.
- Over 700 installations throughout Australia. All designed, developed and manufactured by **Labtam.**
- Winner of the Australian Design Award.
- Winner of the Australian Export Award.
- Winner of the Victorian Business Award.
- Winner of Your Computer, Australian Hardware of the Year Award.
- A major contributor to Australia's export revenues.
- Creating substantial employment for Australians
- Expanding at 60% per annum.

Opening the door to high technology for Australia

Australian Innovation ...Leading the Field.

Labtam

G.X.I. 1/028

For further information regarding Labtam computers contact Labtam International Pty. Ltd. 43 Malcolm Road, Braeside, Vic., Aust. 3195. Phone (03) 587 1444.

The Tandy TRS-80 *Colour Computer* 2.

also $19.95, and the bill comes to $564.90. With the colour monitor, it goes up to $804.90.

The Sega's basic configuration includes the 32 Kbyte computer and a BASIC cartridge for $329. Add to that the cost of a joystick ($27.50), the data recorder ($99) and an average-priced game ($39.95), and rental of some of your television time (the value of which we'll assume is nothing, for the moment), and the total is $495.45. If we put the price of a colour monitor or television at $400, the complete system would cost $895.45.

The Tandy costs a very reasonable $229, but add the basic cassette recorder ($79.95), the two-joystick set ($30), and an average game (we were given a range of $9.95 to $195, from which you might take a very general average of around $30) and it comes to $368.95. Add the maybe-$400 monitor mentioned above, and it becomes . . . $768.95.

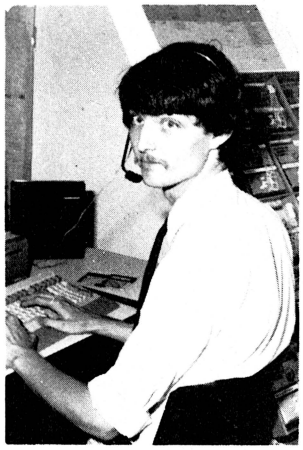
The C16 games pack is good value at $159 for the 16 Kbyte computer, a joystick, a carry case and the Jack Attack game. The average price of extra games is $12, while the Commodore Datasette retails for $55. That's $226.50 all up. Though our imaginary monitor/TV would bump the Commodore's price up to $626.50, you'd probably never invest that much in this machine; the C16 can't be upgraded with more memory, so you'll always be limited in what you can do with it.

Of course, you'd want more than one game, but we've added the average price of one cassette or cartridge just to give you an idea of what you're in for; over a number of game purchases, the Sega and the Tandy would be considerably more expensive than the Amstrad . . . which might even justify the colour monitor . . . well, you know how justification works . . .

Otherwise, the question of television, colour monitor or monochrome monitor depends on things like how many televisions there already are in your household (or how possessive you are of viewing time on your only set) and on how much money you have to spend. Then there's the fact that the Tandy games don't seem to make much use of colour anyway, so you wouldn't be missing much by using a monochrome monitor with it — you would with the Sega and Amstrad.

Well, if you're raiding a lean piggy bank and you're really buying a computer for a young *child* (say between the ages of three to six) to blast the aliens or jump on the insects with, and you're not expecting it to be a long-term computer investment — the Commodore 16 is great value at $226.50.

But for overall appeal and value, we think the Amstrad cleans up. For only a small difference in price it offers a good deal more than the Sega or Tandy. Its games are the most entertaining and spectacular; its memory is of a size respectable enough to extend beyond joystick capers (it's easily upgradable with a $499 disk drive); and it has had considerable success in the marketplace, ensuring ongoing software support. Take that — Zzzzzapp! □



Tony – Programmer

Mary – Receptionist

PRINTERS	
Brother M1509	call
Olympia NP165	$470
Epson LX	$449
HP Laserjet	$4999
HP Inkjet	$899
Daisywheels	fr. $539
Toshiba	call
MODEMS	
300, 600, 1200, 1200/75 auto-answer	$279
Apple Hayes compatible with Viatel software	$245
MONITORS	
Taxan screens	fr. $165
High resolution RGB colour	fr. $450
COMPUTERS	
Olivetti	call
Adler	call
IBM	call
Commodore	call
Compatibles	call
APPLE	
Grappler+	$56
Soft 80 column card	$93
Serial card	$93
Z80 card	$49
128K RAM card	$149
Printer buffer card	$85
Shugart drive	$195
Chinnon drive	$225
SAM voice card	$49
Ext. 80 column card	$89
1 MEG memory card	$713
Taxan RGB card	$145
Taxan Ext. RGB card	$376
6 Mhz Z80	$115
Light pen card with software	$165
IBM	
Joysticks	$36
Joystick cards	$55
20 MEG hard disk	$1280
Intel Above Board	$649
Hercules compatible (leading make) card	$379
Printer buffer card	$249
8087 co-processor	$264
Irwin tape drive	$1184
Enhanced keyboard	$185
6PAKS	call
10 Mhz turbo card	$460
RS232 card	$70
SOFTWARE	
Plusworks (run Appleworks on Apple II plus)	$34
Megaworks	$199

BORLAND software at terrific prices.

Prices subject to change without notice.

HOW TO AVOID COMPATIBILITY PROBLEMS

Computer Haven. A world of friendly microcomputer experts. Where compatibility problems — between price and after sales support, expertise, and service, don't conflict.

Computer Haven presents the latest and best microcomputer products at world beating prices — fast. And you won't lose out in the long run either, because you'll find our service world class too. Here's why: 5 years microcomputer experience. Longer than just about any of our competitors. Professional business expertise (20 years as a matter of fact). Qualified technicians. Qualified programmers. Experienced sales staff. No question. But if you have any questions, Computer Haven will give you the answers.

So, if you're shopping for a computer product or a complete computer system, give us a call, because now there's no compatibility problem.

Günter – Business Manager

William – Software Support

(02) 349 2366

COMPUTER HAVEN

CONSULTANTS TO THE MICROCOMPUTER INDUSTRY

183 Maroubra Road, Maroubra Junction, N.S.W. 2035

Vince – After Sales Support

Our Staff – The Intelligent Group

FIVE ON THE DIAL

When it comes to microcomputer communications, Matt Whelan has learnt it all the hard way — with daily practical use for the last five years. He's closely followed the development of modems in this country, and now checks out five of the latest models from the most basic to one that offers everything — for a price!

Five years ago *Your Computer* instituted many of the 'computer age' concepts that are still far from commonplace.

People still talk of the work-from-home electronic link mostly as a development with 'future potential'. Microcomputer-controlled typesetting — from author to editor to the finished bromides with no hard copy in between, and all in different locations — is only now occurring in more than a handful of places.

Both these mechanisms have been an integral part of the magazine's production

since its first year of publication, 1981, and both have relied totally on telephone communication.

To achieve that, we needed modems — the MOdulator/DEModulators which turn the computer's digital signal into audio signals acceptable to the telephone network. And in 1981 we didn't have a big choice: we could either purchase one of the outrageously expensive units designed for minis and mainframes, hire an outrageously expensive Telecom modem, or buy one of two just plain expensive acoustic couplers available on the local market.

We bought acoustic couplers, and all the attendant problems — poor connection with the telephone handset, granules compacting in the microphone after prolonged use, and susceptibility to external noise interference. We survived, but were overjoyed when the day of the mass-market direct-connect modem (which plugs straight into the phone wires) arrived courtesy of the low-cost Dick Smith Dataphone.

While early versions of that unit (we bought four of the earliest) had problems of their own, it was paradise compared with what had gone before. More important than our temporary improvement in communications, however, was the subsequent explosion in the modem market.

Today the problem isn't finding a modem — it's selecting one from the dozens of brands on the market, and deciding which features (and consequently, which price range) suit you.

What's In A Mode

Your first decision will be what mode suits your communications needs — CCITT V21, V22, V23, V22 bis (from a French word which has the same meaning as encore) or even Bell 103, 202 or 212. If that sounds like a mouthful, it is — and it's also an earful when we get down to explaining it.

First, let's look at the two standards (the standards define the frequencies the modems will use, their operating modes and so on). The Bell standard is the one used in the United States, while CCITT rules in most other countries including Australia (which is why we missed out on the enormous range of cheap, feature-packed modems we read about in the American magazines).

Here's what the various standards you'll hear quoted mean:

V21: The 'basic' 300 baud (or, more correctly, bits per second — bps) full-duplex modem standard, used by virtually all the private and user-group bulletin board systems and available on most major commercial networks. If you could have a modem meeting only one standard, this would be it for the moment — 300 bps is the 'universal language' of communications for now. It's an ideal speed for reading the information as it is transmitted to your screen, but feels excruciatingly slow for large file transfers.

V22: Four times as fast is four times the fun, as long as you can find someone to talk to! V22 provides for operation at 1200 bps full duplex, the rate provided by most 'high-speed' dial-in systems. Only one or two bulletin boards operate at this speed, so you're restricted to business systems and large networks like OTC's Midas, Telecom's Austpac, and so on.

V22 bis: The charge of the Bit Brigade! Transmission at 2400 bps full duplex means you can shift around 3000 words a minute, or transfer the contents of a 360 Kbyte IBM diskette in 25 minutes. Until recently 2400 bps was considered the highest speed possible (with any reliability) on the voice-grade telephone network. Of course, there aren't too many other 2400 bps modems around for you to talk to just yet.

V23: A bigger number, but not more speed. V23, used by Telecom's Viatel and other videotex services, is meant to be an in-between standard, providing lower-cost 1200 bps communication using half-duplex or a limited form of full-duplex transmission. It can be a real pain. With modems, half duplex means you can receive or transmit, but not at the same time (rather like two-way radio), so you need software which can handle the switches between modes. The limited full-duplex mode provides a 75 bps 'back channel' but again, in many cases, you need software to handle the speed changes or a serial port which can handle the split baud rate. This seems to be more trouble than it's worth — if it wasn't for Viatel, it would be a (deservedly) forgotten standard. Fortunately, several modem manufacturers have made V23 bearable by handling its idiosyncracies internally with bit-rate converters which connect to the micro at a single speed.

Bell: The Bell standards break down much the same way as CCITT, but happen to use different frequencies. Bell 103 is the 300 bps standard equivalent to V21, 202 is the 1200/75 equivalent to V23, and 212 is the 1200/1200 match for V22. Fortunately the incompatibility stops there — the 2400 bps standard in the US is V22 bis, so the higher-speed units being produced there will happily talk to ours.

Another Standard

American modem manufacturer D C Hayes established another standard we should know about — the 'AT' standard for control of intelligent modems.

Virtually all 'auto-pilot' communications software is designed to drive a Hayes-compatible modem — usually offering a menu selection of numbers to call, calling the selected number automatically, connecting at the right baud rate, hanging up the line when asked, and so on.

You can control a wide range of modem functions with the 'AT' command set (so named because the modems recognise commands preceded with AT, known as the attention character) and, because it has become the *de facto* standard, you should consider it a primary feature to look for in an intelligent modem.

Dumb Modems

Well, if they're not intelligent modems, they must be . . .

Your basic, low-cost modem only does its job of transmitting information — you have to handle the tasks of setting up speed, data format, dialling and connection to the line. And in many situations, that's all you need — if you're in that position, it would be a waste to spend the extra on a full-featured intelligent modem.

Some 'dumb' modems have a few 'smart' features, like auto-answer and auto-disconnect, without displaying the full intelligence of something like the Hayes Smartmodem.

Many also now support multiple standards, usually V21 and V23. You can pick them by the front-panel switches — the more switches, the more features.

Of course, the fully featured smart modems have no switches at all . . .

The Higher Price of Intelligence

A smart modem is an expensive modem — we say that despite the dangers of generalisation. Bit for bit and feature for feature, the smarter modem will naturally have to be more expensive because of the circuitry and programming required to give it its intelligence.

The modem market is now wide open, and there are exceptions to the 'natural' pricing structures. Some plain modems ▶

are too expensive, some are very cheap — the standouts are usually the ones which have been on the market longer, and haven't kept up with the wave of highly competitive releases.

Modem prices start at well under $200 and climb to over $2000, so there is a lot of choosing to do.

The 'base' models are usually the plain manual 300 baud units, which range from $200 to $300. If your communications needs are simple, this is where to start.

The next category is the Viatel-style modem, a combined 300/300 and 1200/75 (V21/V23) unit (no one would be silly enough to produce a V23-only modem). A wave of releases in this field was prompted by the launch around two years ago of the AMD 'world modem' chip, which combined not only V21 and V23, but also the Bell 103 and 202 standards. Most modems in this class use the AMD chip, and provide the Bell standards as a bonus for anyone who wants to (or can afford to) call direct to the United States.

The manual versions of these modems hit the market at upwards of $600, but can now be had for as little as $350, depending on the features provided.

The market-stunner in this category is Microbee Systems' Beemodem, which is cheaper than the 300 bps units as well, at $189.

Next up are the 1200 bps full-duplex units and the full-featured smart modems, which start at around $700 and climb from there to the dizzy $2000-plus heights.

From Cheapies to Know-it-alls

The range of modems we selected for this story covers the spectrum, from low-cost do-littles to high-priced high flyers.

They're reasonably representative of the state of the market, and we thought a short rundown of the styles and prices of the different units would give you a starting point for your communications shopping spree.

We'll look at them in price order which, thanks to the Beemodem, is slightly out of 'standards' order:

Microbee Beemodem: Bare-bones price ($189), bare-bones features. The Beemodem doesn't take advantage of all the features of the AMD chip, providing only CCITT V21 and V23 standards in a totally manual-control package. It has three switches — one to connect the modem to the line, one to select 300 bps or 1200/75, and one to select Originate or Answer modes. (Modems must transmit and receive on different frequencies so their messages don't get confused with each other — these are labelled originate and answer, and by convention the calling modem is set to originate, the answering modem to answer. It doesn't really matter as long as you agree with the person at the other end which mode you'll use.)

The Modem 1 is just our style of modem, and would be hard to go past if you needed intelligent operation and multiple standards — the only thing missing is a 2400 bps mode (which would raise the price dramatically anyway).

There is only one indicator light, labelled CD — it stands for Carrier Detect, and indicates whether the modem has found a suitable frequency from the modem at the other end. A carrier detect indicator is a must, even though we've seen units without them, while other indicators like receive data and transmit data are helpful. The Beemodem has none of these 'frills'.

It also comes with a bare-bones manual: two pages' worth! Admittedly, it is designed for use only with the Microbee, so the manual doesn't have to cover the wide variety of possible uses other modem makers have to think about.

However, you *can* use the Beemodem with other machines. It involves purchasing a small power supply (it normally draws its current direct from the Bee's serial port) and making up a suitable cable. Jim Rowe explained how in YC's February 1985 issue.

Watch out if your machine doesn't support split baud rates, however, as the Beemodem (like most of the lower-cost 1200/75 units) doesn't have a bit-rate converter.

Datasat V21: The Datasat is typical of the low-price, high-quality 300 bps single-purpose units on the market.

It sells for $215, and is designed to sit neatly under a telephone handset. Two switches — phone/modem and answer/originate — are all you get, and all you need. There are four indicator lights: power, carrier detect, receive data and transmit data.

Receive data and transmit data indicators, missing on many low-cost modems, are particularly useful when you're not communicating and can't figure out why — these lights will tell you if data is reaching the modem, isolating any communication breakdown to the line side or the computer side.

We received the wrong manual with our test unit, but based on Datasat's other documentation we'd guess it is mediocre, but improving. Mediocre *can* be a compliment when describing modem manuals . . .

Avtek Multimodem II: The Avtek is typical of the latest wave of low-cost, good-value V21/V23 modems. It sells for $349, and provides auto-answer operation, several modes, and comprehensive self-test facilities.

The box itself is big and ill-proportioned — the designer obviously took a hobbyist box 'off the shelf' and fitted the bits in. It's much wider than a standard phone, but not deep enough for the phone to sit on. A shame.

The front panel has three switches: a rotary dial which allows selection of Bell or CCITT 300 bps operation, plus CCITT 1200/75 and two optional configurations which can be set up by strapping inside the unit; an auto/manual/offline toggle switch to select connection mode; and a three-position switch for the test modes.

LEDs (sensibly grouped by function, a rarity!) indicate power, connection, carrier detect, receive/transmit data, RTS, CTS, and ring detect.

The manual contains a reasonable amount of useful information, but leaves out (or glosses over) too much for our liking. It is also disorganised, and would leave a beginner floundering. Unfortunately, it is typical of modem manuals and can't be called below-standard given the current standards . . .

Sendata Xiocon Modem 1: What a mouthful! Those early acoustic couplers of ours were Sendata units, which makes this company one of the communications pioneers here, and its modems have always had a good reputation.

The Modem 1 should do nothing to change that. It's a well-priced, well-de-

signed unit which has just about everything we'd want in a modem — Hayes compatibility and the three major standards, V21, V22 and V23 (as well as Bell 103 and Bell 212). This spread of standards is rare: usually you will find V21/V23 units, or V21/V22, but getting all three in is a big plus, especially at $720.

It has automatic baud rate detection at the micro end, and will connect to the line at that speed. Unfortunately, it won't detect the speed of the calling modem in an auto-answer situation, so it has to be set up to the correct speed to take the call.

The Modem 1 (produced as a joint venture between Sendata and Xiocon) is a neatly designed slimline unit which sits under the phone, but requires an external power supply. A DIP-switch at the rear sets its default mode of operation, although these parameters can be changed using the Hayes commands. There is also an on/off switch at the rear.

The front panel contains no switches (an intelligent modem shouldn't need any), only a row of indicator lights for power, carrier detect, ring indicate, transmit/receive data, on-line, high speed, CTS and DTR. The documentation we received was a photocopied, preliminary version but seemed to be well organised, comprehensible, and full of the information a user will need . . . a pleasant change in this market.

It's just our style of modem, and would be hard to go past if you needed intelligent operation and multiple standards — the only thing missing is a 2400 bps mode (which would raise the price dramatically anyway).

Netcomm Smartmodem 1234: A finalist in the Australian hardware section of the Personal Computer of the Year awards, the Smartmodem 1234 is as close to perfect (for our needs) as we've seen. It falls down in a few areas, but the ever-energetic Netcomm engineers are working on those now.

The 1234 is a Hayes-compatible unit which provides *all* the standards we've discussed, and throws in automatic speed detection in both directions. The big letdown from our point of view is the fact it requires the user to change speeds to that of the incoming call after it has detected it and issued a message (such as CONNECT 1200).

It's similar to the Sendata in design (both are modelled basically on the Hayes Smartmodem, with its rear switches, front lights, and attractive slimline under-the-phone casing), although it's certainly more stylish and features an indicator light to let you know whether it's in auto-answer mode.

The documentation is the best we've seen with a local modem — while it could be improved in a few areas, other makers could do well to use it as a model even now. And the Netcomm unit's big plus is the fact it comes with powerful communications software which drives the modem automatically in either normal or Viatel modes. This takes a big load off the user (but only if they're using an IBM PC or lookalike).

At $1800 the 1234 is a bit of a fright, but it's the answer for the communicator who needs everything.

Phoney Stories

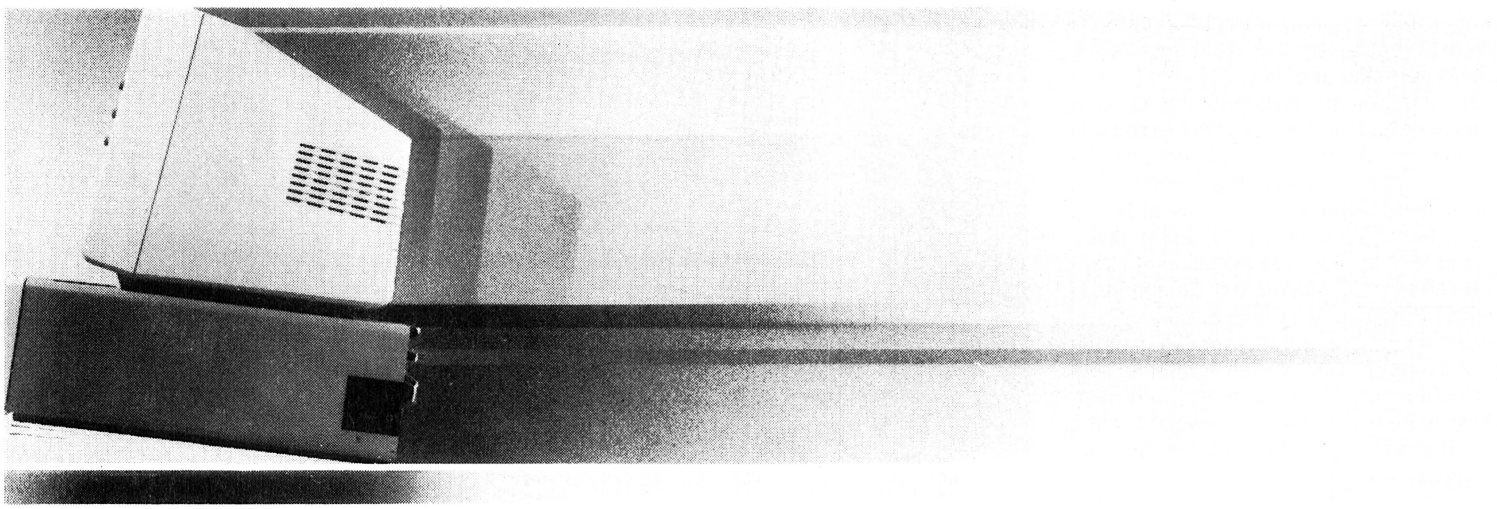
Several modems come equipped with their own attached phones, which is convenient because you can simply pull your current phone out of the wall socket and replace it with the phone/modem unit.

However, it's also a nuisance because in most cases the supplied phone is one of those awful, cheap Asian echo-boxes.

We recommend you buy a modem without a phone, or at least take one which allows you to select your own phone and plug it in (Netcomm, for example, provides this option). Remember, though, that to connect a modem only to the line to allow use of your current phone you need to have Telecom install an extra socket, at a cost of around $40.

And don't forget to check with your supplier, or Telecom, if you're planning to use a modem through a PABX or Commander telephone system, as special connections may be required. □

AN IBM PC/XT'S VIEW OF A LASERNET TURBO PC/XT...



...at less than $2000 **INCLUDING** Epson Printer.

The Lasernet system is 75% faster than IBM at a fraction of the price. Fully compatible with IBM PC/XT software, it comes with dual 360K Mitsubishi floppy drives, 640K RAM, a parallel, serial and games port, clock/calender, 135 Watt power supply, quality cherry switch style keyboard. It runs MS/PC-DOS 2.11/3.1/CPM86 flight simulator etc.

We offer you a choice of a green or amber Mitsubishi composite monitor. The total price is $1995 which includes tax and the Epson LX80 printer complete with tractor kit.

Optional Extras: The above system is also available with a number of options. For:—

- 10 megabyte hard disk add $899
- 20 megabyte hard disk add $999
- colour monitor upgrade for above systems add $299
- Hi-Res. monochrome monitor upgrade for above system add $99.

Lasernet offers a full support service and a **12 Month Warranty** on system unit and Epson printers.

SUPER SPECIAL
Epson LX80 & FX105 NLQ printers at unbeatable prices

LASERNET

Computing Systems Pty. Ltd.
248 St. Kilda Road, St. Kilda. 3182
Phone: (03) 534 0489
Telex: AA 30625

A GOOD FORTRAN IS HARD TO FIND

Allan Miller has used just about all the versions of FORTRAN *you can name, and no doubt a few you've never heard of, in his 30 years' work with the demon computer. He'd almost abandoned it, following current trends, when lo and behold! — a new version of* FORTRAN-77 *appeared that restored his faith in that often-reviled language.*

FORTRAN has been the programming language of scientists and engineers for about 30 years. Even though its demise has frequently been predicted, it still survives, mainly due to the large amount of software written in it, and the difficulty in emulating some of its features in alternative languages such as Pascal.

Respectable FORTRAN compilers have been available for 8-bit micros since about 1977, with Microsoft, Prospero, Supersoft, Nevada and others from which to choose.

The situation has until recently been very much less satisfactory for the IBM PC and compatibles. In the early days of the IBM PC it was said anything which could be done in FORTRAN on an 8-bit micro in five minutes shouldn't take more than an hour on an IBM PC. It was an exaggeration; with early versions of Microsoft FORTRAN, three minutes was nearer the mark.

FORTRAN is a much more portable language than most (BASIC is right at the other extreme), which is due in large part to the widely accepted standards. The current FORTRAN standard is known as FORTRAN-77, after its year of completion (and it wasn't 1877), though it wasn't published until the following year. The previous standard was known as both FORTRAN-66 and FORTRAN IV; a FORTRAN-8x is not far away. There are two versions of FORTRAN-77: the full language and a subset of it.

Microsoft's Winner

The best-known FORTRAN for the IBM PC, or any machine running MS-DOS/PC-DOS, has been the one produced by Microsoft. This is an implementation of the subset language of FORTRAN-77 augmented with some of the features of the full language. Microsoft FORTRAN has improved substantially over the years, gradually creeping up towards the full language. The compiler itself is written in Pascal. Version 3.30, which is almost the latest, is a massive 235 Kbytes in size, and ignores the rarely used third pass. The most prominent features of the full language which are still not supported are:

- The concatenation operator for character strings: for example, character name*30, given*15, family*15 name = given // family. Concatenation is now possible in Microsoft FORTRAN, but not as above.
- The use of ranges for array variables: for example, dimension prices (1954:1985, 12) to hold monthly data from 1954 to 1985.
- The use of expressions in the PARAMETER statement: for example, PARAMETER (MAXROW=50, MAXCOL=20, NCELLS = MAXROW*MAXCOL).

The early alternative to Microsoft was the Supersoft compiler, which was smaller and faster, but only the old FORTRAN-66, not the 77 version.

At the beginning of 1984, Digital Research announced its full FORTRAN-77; FORTRAN users waited eagerly until it finally appeared about the middle of the year. It was a full FORTRAN-77, but it generated very large .EXE files, typically twice as large as those from Microsoft, and on release it contained a large number of bugs. One good feature was that it supported an extended accuracy format (REAL*10), which is the same format as that used by the 8087 floating-point processor.

Meanwhile, with almost no publicity, Prospero had released its compilers for both CP/M-86 and MS-DOS. Prospero was well known for its Pascal compilers, which are probably the best available for people who want strict Pascal rather than Compas/Turbo Pascal. Its FORTRAN compilers are faster than Microsoft or DR, and produce much more compact executable programs — but they are for FORTRAN-66.

New Bugs

That was the scene up to about mid-1984. Then the publicity started for another full FORTRAN-77, this one to come from▶

Ryan-MacFarland. We were told it was the only compiler to have passed the test of some US government department as a completely error-free FORTRAN compiler. It was apparently released briefly in the US in about August 1984, but users quickly found so many bugs that it was withdrawn from the market. It finally reappeared about May 1985, as both RM-FORTRAN and under the name IBM Professional FORTRAN.

RM-FORTRAN (RM) does indeed support the full FORTRAN-77 language, with extensions, including in particular bit operations, which are so necessary for bit-mapped graphics work; the FORTRAN-77 standard makes no allowance for bit operations. The compiler is fairly compact at just over 100 Kbytes, and the resultant code gives fast execution times, but compilation is *very* slow. On my system, it compiles about 240-250 lines of source code per minute; contrast this with Turbo Pascal, which compiles about 7000 lines per minute on the same system.

By late 1985, many companies, universities, CSIRO divisions and other users had purchased several FORTRAN compilers, each time believing the new one would compensate for the deficiencies of those which had gone before. This would have meant an average expenditure of perhaps $2000-$2500 — even more if they had bought the lot.

Diligent readers of Dr. Dobbs Journal around late 1984 will have seen a very small advertisement for yet another FORTRAN-77. This was for Lahey's F77L. Who is Lahey's? — you may well ask; I wrote to them for more details. The literature I received in January 1985 promised everything I wanted, but by that time I was thoroughly cynical and decided to wait until someone else had tried it. I went back to my good old Prospero FORTRAN, but cursed the lack of IF ... THEN ... ELSE constructs and the other goodies of FORTRAN-77.

The literature from Lahey's stated it had been producing FORTRAN compilers since 1967 for GE and Honeywell. The company is based in a suburb of Los Angeles just south of its international airport and bordering the Pacific Ocean. Ryan-MacFarland is just down the road — so close the two companies have the same zip code.

Then, in June 1985, Volume 3, Part 1 of the journal *Computational Statistics & Data Analysis* arrived in Australia; this journal contains announcements and occasional reviews of statistical packages. That issue contained a lengthy announcement that the mainframe package P-STAT was now available for use on IBM PCs. More importantly, though, as far as I was concerned, it described the process of selecting the FORTRAN compiler for the exercise. Microsoft, RM and Lahey's compilers were considered. None of them was adequate, but RM and Lahey's both looked promising. Both companies were approached, but only Lahey's co-operated. The resulting modified Lahey's F77L compiler was the one which was finally used, compiling a total of 1114 subroutines — none of which was changed for the compiler — and producing a final package about 3.5 Mbytes in size.

In the early days of the IBM PC it was said anything which could be done in FORTRAN on an 8-bit micro in five minutes shouldn't take more than an hour on an IBM PC. It was an exaggeration; with early versions of Microsoft FORTRAN, three minutes was nearer the mark.

About Lahey's F77L

My copy of F77L, version 1.21, arrived early in July 1985, and I soon abandoned the dear old Prospero. F77L has been in heavy use since then. In that time I have found just one bug, though I gather others have been discovered. I sent a simplified version of the program to Lahey's; about a month later, at no cost, I received a copy of version 1.34, in which the bug was supposedly fixed. The code now compiled, instead of reporting a compiler error, but on execution the program hung at the offending point. The bug was finally fixed in version 1.36.

Many supposedly FORTRAN-77 compilers on mainframes and minicomputers lack some of the features of the standard. One such compiler I sometimes use lacks the Inquire feature; this enables a running program to check, for example, whether a file exists on a specified drive, or to find out its characteristics. Another compiler frequently objects to mixed-mode expressions (such as integers and floating-point) and asks me to simplify my code as the compiler is stuck in a loop! In the time I've been using F77L, and using it very heavily, I haven't found a single feature of FORTRAN-77 which it lacks, and have only encountered minor bugs in old versions, while I've found many bugs and deficiencies in three other compilers for larger machines.

Lahey's describes its compiler as a superset of FORTRAN-77. Among the extensions are:

- F77L will accept either free-format or standard-format source code. A hangover from the punched-card era is the restriction that FORTRAN instructions should start in column 7 and not extend beyond column 72. Columns 73-80 used to contain something like SUB00790, which was useful whenever the elastic band broke and the deck of cards fell onto the floor.
- Bit operations are supported for both two- and four-byte integers (as in RM but not Microsoft or Prospero).
- The use of INCLUDE and CHAIN.
- Recursion: in other words, a subroutine can call itself.
- Variable names can contain up to 31 characters (six in standard FORTRAN) and may contain the underline and $ characters. NB: Microsoft has no limit on the length of names but only recognises the first six, so SYMBOL, SYMBOL1 and SYMBOL2 are all treated as the same!
- A random number generator is included; it seems to work well. This is also provided in Prospero and RM, but not Microsoft. As the Microsoft random number generator for 8-bit FORTRAN (also used in its BASIC) is a disaster, with a cycle of 90,288, it is perhaps a good thing Microsoft doesn't provide a random number generator.
- System calls may be made from within an executing program, for example to access the clock, display a directory, erase or rename files, and so on.
- By specifying 'ACCESS=TRANSPARENT' when a file is opened, any file can be read. Normally files to be read, or files written from FORTRAN programs,

are either formatted, which means they have carriage returns at fairly regular intervals in them, or unformatted, in which case one or two bytes at the start of each record contain the record length in bytes. This feature could be useful in accessing files not written from FORTRAN programs.

The data types supported in F77L are:

- INTEGER*2 and INTEGER*4 (but not INTEGER*1, which is in Prospero)
- REAL*4 and REAL*8 (= double precision)
- LOGICAL*1 and LOGICAL*4
- CHARACTER (up to length 65,280; the limit is 127 in Microsoft and 255 in RM)
- COMPLEX*8 and COMPLEX*16.

Documentation

The manual is excellent, in my opinion; it was obviously written by someone who is both a FORTRAN user and a good writer. In contrast, the Prospero manual is rigorously unintelligible, while the RM manual is huge and confused. I get the impression the person who wrote Lahey's manual just sat down by the pool and wrote it over a weekend: it's compact, it's fluent, and it gives you the information you want with good examples. The RM manual reads as if someone sweated blood over it for months.

One of the unusual features of the Lahey's compiler is its F77L.FIX file. As its name suggests, this fixes bugs in the compiler. The .FIX file is an ASCII file, which means if you find a bug in the compiler, you can ring Lahey's. When they've fixed it, they telephone back a line or two for you to add to the end of the .FIX file — much easier than trying to patch a binary file using DEBUG.

The Good Features

The outstanding feature of F77L is its speed. Running at 6.67 MHz with all files in RAMdisk, it compiles at the rate of about 1800 lines of source per minute. On this system (see Table 1), it is three times faster than Prospero, four times faster than Microsoft, and six to eight times faster than RM. My system heavily favours the Microsoft compiler; on any system using physical disks, hard or floppies, loading that hefty 235 Kbytes of compiler adds substantially to the time. The time taken to repeatedly load and reload the two passes of the Microsoft compiler into RAMdisk is not shown.

It should be noted that there are slightly more recent versions of RM and Microsoft compilers, and Prospero is still promising to produce a FORTRAN-77. The tests shown here are all intensive number-crunching exercises, which is what FORTRAN is designed to do.

By late 1985, many companies, universities, CSIRO divisions and other users had purchased several FORTRAN compilers, each time believing the new one would compensate for the deficiencies of those which had gone before. This would have meant an average expenditure of perhaps $2000-$2500 — even more if they had bought the lot.

In a review in PC *Magazine* ('Serious FORTRAN', by Chris Wolf, December 24, 1985), using a forecasting model of the world agricultural economy which produced .EXE files of over 400 Kbytes, it was shown that F77L is faster than RM for disk I/O. (In Wolf's review, 'Pro-FORTRAN' refers to IBM Professional FORTRAN from Ryan-MacFarland, not to Prospero FORTRAN, which is not mentioned.)

In other tests of accuracy not reported here, Prospero FORTRAN has always given the most accurate results, followed by Microsoft and Lahey's, which usually give exactly the same results to the last bit; RM has always been the least accurate.

Know Your Faults

The next feature, and perhaps more important, is the good error diagnostics. Good error messages can save many hours of costly development time and are worth far more than shaving a few milliseconds off execution times.

There is none of the 'ERROR XYZ123 at address 004FC6' kind of nonsense in F77L. The messages are in clear English, with the source line number and the display of the offending line. The warning messages are far more extensive than I have encountered in other compilers, and often point up errors which have passed unnoticed for years in mainframe programs. I quite often use LINPACK, a high-quality public domain set of FORTRAN routines for matrix algebra, and F77L gave warnings for two of its routines; there are clearly real errors in both cases.

Another example occurred when recompiling a program which had previously been compiled using Prospero FORTRAN. F77L told me of a fatal error: there was a jump into the range of a DO loop, yet the Prospero compiler had not even given a warning message. Similarly, a VAX FORTRAN compiler failed to tell me a format statement was missing in a program.

The compiler warns of variables which have been declared but unused, others which have been set and not used, or which have been used but not set; this is particularly useful in picking up typing errors. If, say, VNAME has been typed once as VNAEM, or an I has been entered as a 1, this testing will pick it up.

The F77L Debugger

"Real FORTRAN programmers don't use debuggers."

Prospero has a nice debugger which is easy to use and fairly compact (about 50 Kbytes), but it requires special options to be set at compile time. RM has a massive 186 Kbyte brute of a debugger which requires an extra 90 Kbytes of RAM over that required by your program, and the use of the /t option at compile time. The Lahey debugger that comes with version 2.0 of F77L is a mere 19 Kbytes — how do they do it?

It doesn't require recompilation of your program and subroutines. When the compiler is invoked, a small file with extension .SLD is produced, containing the information needed by the debugger: names of variables, addresses, and so on. This is typically about 25 per cent of the size of the corresponding .OBJ file. If you haven't saved the .SLD files, it's easy enough just to recompile — yes, as compilation is over in a flash, you soon find yourself quite casually recompiling rather than searching to find where you put the .OBJ or .SLD file.

The debugger is called SOLD, for Solid On-Line Debugger. To use it on program MYPROG, which has unexplained faults, ▶

The Lahey's manual is excellent; it was obviously written by someone who is both a FORTRAN user and a good writer. In contrast, the Prospero manual is rigorously unintelligible, while the RM manual is huge and confused. I get the impression the person who wrote the Lahey's manual just sat down by the pool and wrote it over a weekend; the RM manual reads as if someone sweated blood over it for months.

the user simply types SOLD MYPROG. It stops at the beginning for breakpoints to be set: for example, BE SUB1, SUB3, which causes breaks to be set at the entry to routines SUB1 and SUB3; and BX *, which sets breaks on the exit from all subroutines and functions. Breaks can also be set on the values of variables; for example, BW ITER > 10 causes a break whenever ITER is changed to any value greater than 10. When a break occurs, the values of any variables can be displayed, source code can be listed, and breakpoints can be added or deleted. In the case of arrays, either individual elements or the whole array can be printed. There is also a trace facility.

The debugger is new to version 2.0 of F77L and still has bugs in it, but it is nevertheless an extremely valuable tool.

The Poor Points

No linker or librarian is provided with F77L. To link programs you use either Microsoft's linker, supplied with MS-DOS, or Lahey's will supply PLINK86 at the dealer's price ($US248 plus postage). If you're lucky, as I was, your LINK will allow for overlays. Microsoft will *not* update the version supplied with your operating system; the only legal way to update it is to buy or update one of the Microsoft languages which uses LINK. Version 3.02 or later is recommended as it contains the /E option, which removes the space taken up by arrays which have not been initialised. If you declare a 100 by 100 double-precision array, the .EXE file will contain 80,000 bytes, all holding zeros unless you use the /E. Do you really want to fill up your disk in this way?

There is no compiler option for flagging code which is not standard FORTRAN-77; that is, which uses features which are Lahey extensions, or which are in FORTRAN-66 but not FORTRAN-77. Also, the manual doesn't indicate which features are not in the standard.

There is no compiler option for compiling integers as INTEGER*2. Most other compilers allow this, but in F77L you have to include something like IMPLICIT INTEGER*2(I-N) in your program. In de- ▶

Example 1. *Fast Fourier Transform using Singleton's algorithm. Series length = 7500; 626 lines of source code, including 148 comment lines.*

Compiler/Version	Compile Time (secs)	Link Time (secs)	Run time (secs)	.EXE size (bytes)
Lahey's F77L 2.00	25	15	46	41,162
Microsoft 3.30	93	21	52	45,408
Prospero Big 2.13	72	51	138	28,416
Ryan-MacF. 1.10	141	12	45	40,120

Example 2. *Inversion of Hilbert matrices of sizes 3 by 3 to 10 by 10, using* LINPACK *(double precision). 424 lines of source code, including 199 comment lines.*

Compiler	Compile Time (secs)	Link Time (secs)	Max. Rel. Error	.EXE size (bytes)
Lahey's F77L	14	11	.16E-03	33,032
Microsoft	57	18	.16E-03	41,534
Prospero Big	42	38	.19E-03	20,736
Ryan-MacFarland	98	10	.27E-03	37,070

Example 3. *Non-linear least-squares fitting of a mixture of two exponentials using the Levenberg-Marquardt algorithm. 1146 lines of source code, including 547 comment lines.*

Compiler	Compile Time (secs)	Link Time (secs)	Run Time (secs)	.EXE size (bytes)
Lahey's F77L	36	12	30	42,584
Microsoft(*)	148	20	34	55,770
Prospero Big(**)	103	53	56	32,512
Ryan-MacFarland	281	12	28	52,894

(*) It was necessary to use the $LARGE meta-command on this problem.
(**) In striking contrast to Microsoft, the small model of Prospero was quite adequate for this example (and the other two). Using the small model (and INTEGER*2) gave the following:

Compiler	Compile Time	Link Time	Run Time	.EXE size
Prospero Small	93	37	37	21,760

SHARP

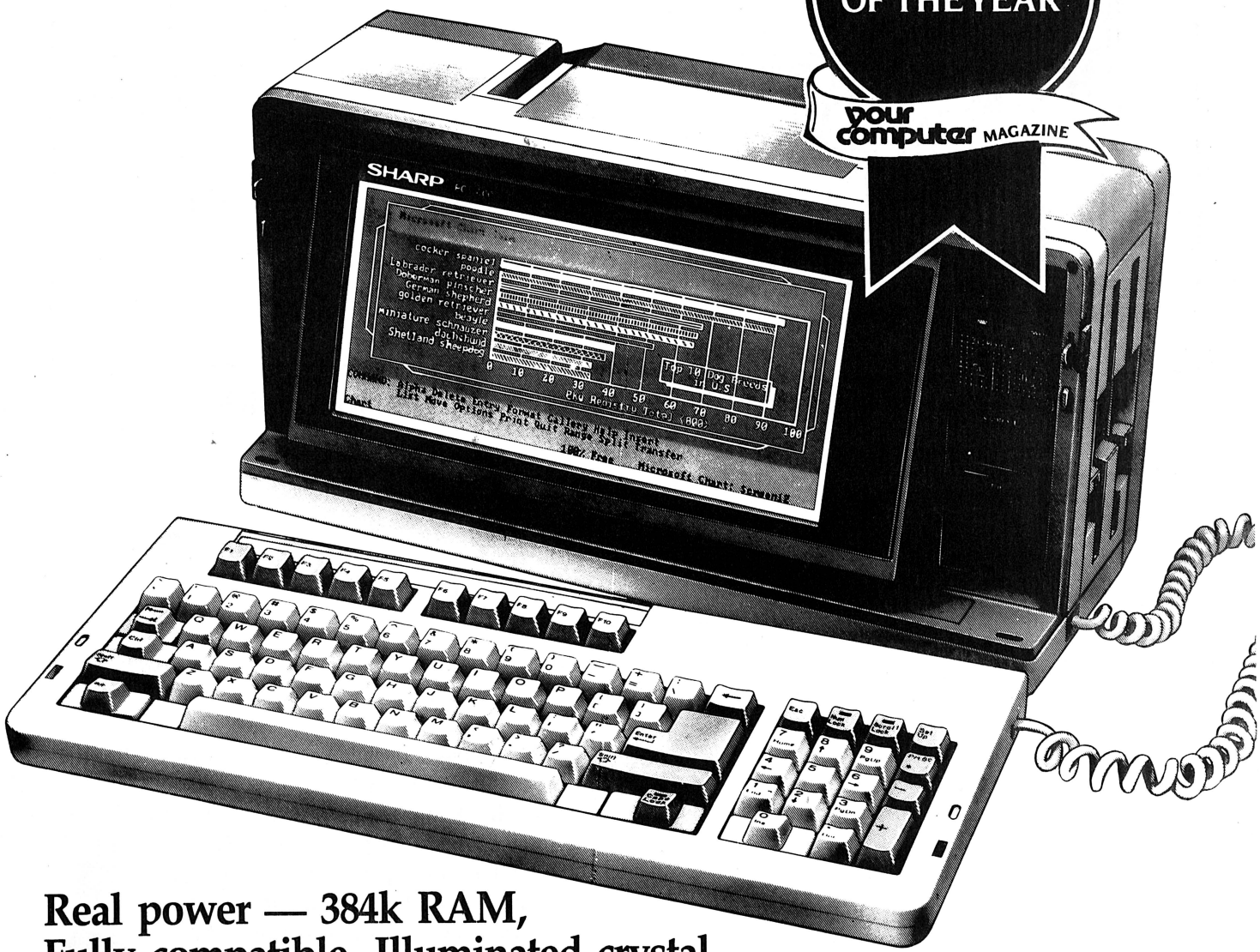
Simply the best in Computers

PC-7000

FINALIST

PERSONAL COMPUTER OF THE YEAR

your computer MAGAZINE

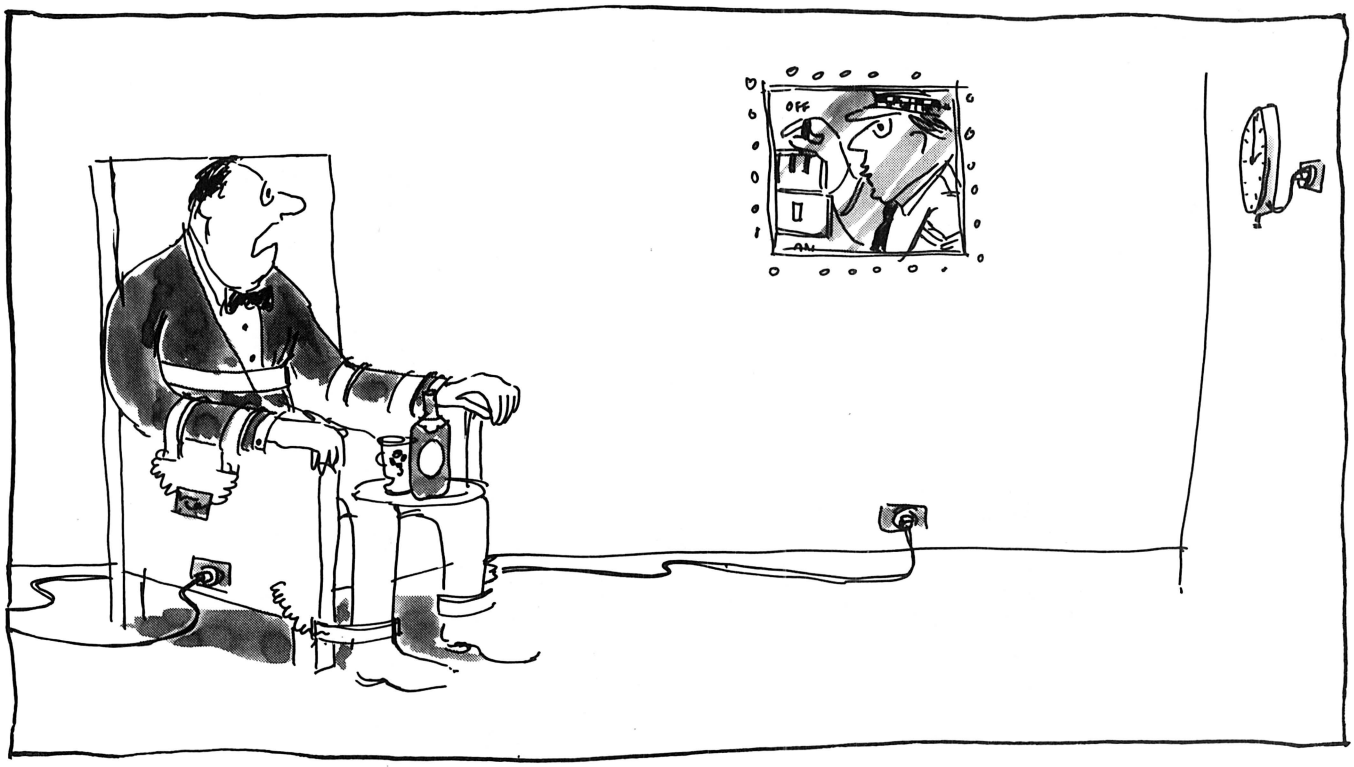


Real power — 384k RAM, Fully compatible, Illuminated crystal display screen. Built-in twin disk drives, Quality printer available. Fully transportable and priced to go, too! Sharp quality.

For an obligation FREE Demonstration in your office or home, PLEASE CALL NOW!

GUMTREE COMPUTERS
14A Brisbane Street,
IPSWICH, QLD 4305
(07) 202-3866

ABE ASSOCIATED BUSINESS EQUIPMENT
5 Biralee Crescent,
BEACON HILL,
NSW 2100
(02) 982-5049



"How was I supposed to know that real Irish Coffee is made with Irish Whiskey?"

It all started when I made a few Irish Coffees the same as I always had.

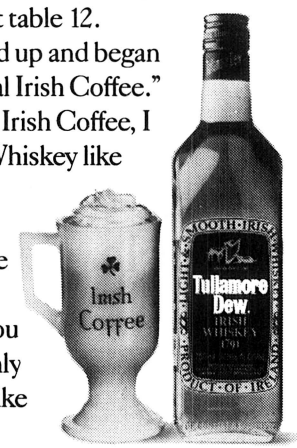
Black coffee, a dab of cream and a nip of Scotch. Served them to the party at table 12.

Then this big guy stood up and began abusing me. "That's not real Irish Coffee."

He says to make a true Irish Coffee, I should use a quality Irish Whiskey like Tullamore Dew.

Next thing, I'm being read my last rites and you're strapping me down.

No one ever told me you make a true Irish Coffee only with a true Irish Whiskey, like Tullamore Dew.



True Irish Coffee is made with the true Irish Whiskey, Tullamore Dew.

Another fine product imported by Continental Seagram.

GSR CS4041 APB0318-A

fence of Lahey's on this point, the FORTRAN-77 standard states explicitly that integers must have the same length as REALS (that is, single-precision floating-point).

There has been criticism of F77L because units 5 and 6 are not pre-connected for terminal I/O. Unit 0 is pre-connected. The FORTRAN standard says nothing about units 5 and 6; that is merely a convention adopted by certain manufacturers. However, WRITE(* and READ(* are required to read/write to pre-connected devices, and they do in F77L.

It's worth noting that F77L (as also RM) requires that you have an 8087 or 80287.

. . . And Compared With Turbo Pascal?

Comparisons between different languages are difficult. A slightly simplified version of the program used in the third example in the table was run under Turbo Pascal. The compilation time was seven seconds, and this was directly to a .COM file, so it should be compared with the sum of the times for both compilation and linking under FORTRAN. As these sums ranged from 49 seconds (F77L) to 293 seconds (RM), Turbo is a long way ahead.

If the Turbo Pascal program had contained all the features of the FORTRAN program, it would have taken about nine seconds to compile. The size of the .COM file using the 8087 version of Turbo Pascal was 21,199 bytes; say 23,000 bytes to allow for the features missing compared with the FORTRAN version. The run time for Turbo Pascal was 37 seconds; say 40 seconds for the full job done in the FORTRAN version. Turbo Pascal only allows two-byte integers, which are adequate for this job, but can be a major disadvantage. Thus Turbo Pascal compiles and links more than five times faster than the fastest of these FORTRAN compilers (F77L) and produces more compact code than all except Prospero, but executes at about 75 per cent of the speed in this number-crunching exercise.

Conclusions

At last we have a really good full FORTRAN-77 compiler which can be trusted. It should be the last FORTRAN compiler you will need to buy; most of my code development is now being done using F77L. It compiles at about the same speed as the VAX 730 when lightly loaded, though linking is faster and simpler on the VAX, but

Good error messages can save many hours of costly development time and are worth far more than shaving a few milliseconds off execution times. There is none of the 'ERROR XYZ123 at address 004FC6' kind of nonsense in F77L.

the error diagnostics and manual are so much better, and the debugger is a joy to use. In my opinion, for those who need to develop code in FORTRAN, Lahey's F77L provides the best environment currently available.

Lahey's F77L runs under MS-DOS and does not require IBM compatibility — good news for owners of NEC APCs or Siriuses.

Several other software products are code-compatible with Lahey's F77L, including Lattice C, the IBM graphics development kit, the NAG-50 library of mathematical software, and a number of graphics packages. The IMSL PC library is not compatible at present.

Postscript

One day after writing the first draft of this article, I needed to write a new program to run on that VAX 730. It compiled first time without error or warning messages. I congratulated myself. Then I linked it, getting the error message, 'Multiply defined transfer address'; the VAX has a habit of giving useful messages like that.

It suggested to me that there were two modules with the same name, but that was impossible. The program had been cobbled together from bits of old programs, and finally I discovered that in the editing process I had managed to insert two consecutive 'END' statements at the end of the main program. The compiler should have found this.

I tested the four compilers on this problem. Prospero and Microsoft both reported the error and gave the line number. F77L reported the error but did not give the line number — a black mark for Lahey's. RM reported no errors or warnings, though the linked program ran successfully. □

Australian distributor: Computer Transition Systems, PO Box 4553, Melbourne 3001; (03) 537-2786.
Price: $750 incl. postage.

Notes: Tests were carried out using MS-DOS 2.11 operating at 6.67 MHz with all relevant files in RAMdisk. For Microsoft, the $NOFLOATCALLS meta-command was used with the 8087 and FORTRAN libraries. The RAMdisk was not large enough to hold both parts of the Microsoft compiler, the source and object files and the libraries and linker; these had to be frequently reloaded into RAMdisk for the Microsoft tests, but the time taken to do this is not shown in these times — hence these times favour Microsoft very considerably.

For the other three compilers, the compiler, linker, libraries, source, object and .EXE files were all in RAMdisk together. The time taken to carry out the tests for Microsoft took as much time as all the other three together.

The default for integers (INTEGER*4) was used for all tests, although two-byte integers would have been adequate. The compiler options were the defaults for all compilers, except that the /na option in Lahey's configuration file was changed to /a; this meant adjustable arrays were limited to 64 Kbytes in size.

Version 3.02 of the Microsoft linker, using the /E option, was used, except for Prospero FORTRAN, which is supplied with its own linker. The CPU was an 8086, and an 8087 floating-point processor was used in all tests.

Alan Miller is a mathematical statistician who has programmed many computers over nearly 30 years, using FORTRAN for over 20 of those years. The need to produce code which runs on micros, VAXes and mainframe computers, and the arrival of Lahey's FORTRAN, have ended a two-year flirtation with Turbo Pascal. He is employed in a statutory authority as a consultant statistician, though at the moment he is a Visiting Senior Research Fellow at Griffith University in Brisbane. □

HOW TO WRITE A STRUCTURED PROGRAM — Part 12

Halley's hay fever is sweeping the country, as we all want to get a visual sniff of the comet's magical, gaseous, dusty tail. Phil Grouse has a good nose for the topical and has bent this month's structured programming lesson to suit the times.

PREVIOUSLY IN this series we completed an exercise using a flowblocked data specification in order to drive the design of a program to process the data structure. The data structure concerned was a telephone book, and the program was required to print the book from a sequential file. This month, we tackle something much more topical — locating Halley's comet.

By the time you read this article you probably won't need a computer to tell you where Halley is: it will be big and bright enough to stand out on its own. As I write this, in January, Halley is currently on its way to perihelion (the closest approach to the sun), and is well and truly out of view. How it will appear later this year is reasonably well known, but, like most comets, Halley can be unpredictable; it may be much brighter, or even fainter, than astronomers expect.

In any event, as the comet wings away from the sun's brilliance to remote corners of the solar system, the program described here will help you catch a fleeting glimpse of its departing dust.

An object in the sky can be located in one of three ways. An astronomer would be happy with two co-ordinates, known as right ascension (RA) and declination (Dec). This pair corresponds roughly to longitude and latitude, except it is drawn on the 'celestial sphere' instead of the Earth. The 'fixed' stars have fairly constant RA and Dec, but planets and comets move relative to the stars, so their RA and Dec change constantly.

Celestial Mechanics

Computing the RA and Dec involves a rather complex exercise in celestial mechanics: you have to solve Kepler's equation for the object concerned, as well as for the Earth. However, that's slightly beyond the scope of this article, so instead we'll take a set of published values for the viewing period and use an interpolation technique for deriving intermediate values. The values used were taken from the 1986 Ephemeris of the Astronomical Society of New South Wales.

Even so, RA and Dec make sense only if you have an astronomical telescope with setting circles. Alternatively, you can use the values of RA and Dec to plot the comet's path on a star map, and locate the comet by reference to known constellations and particular stars.

The third method is probably the simplest. It involves converting the values of RA and Dec into the so-called 'Altazimuth' co-ordinate system, using the object's altitude (its height, in degrees, above the horizon), and its azimuth (the bearing of the object from due North). For example, if the program predicts that the comet will have an altitude of 28 degrees and an azimuth of 90 degrees, you aim the binoculars towards the East (a bearing of 90), then tilt up 28 degrees. Azimuth is measured from 0 to 360 degrees; north is zero, south is 180, west is 270, and so on. By the way, binoculars are the best method for viewing a comet, since they have a much wider field of vision than a telescope.

The problem with the Altaz system is these co-ordinates depend on your geographical position. Since you're unlikely to change your location too often, these can be set into DATA or assignment statements. The program also needs to know what time frame you're using, so you must specify the number of hours before or after GMT (Greenwich Mean Time).

The program developed here is pretty minimal. It could be modified to give a listing of Alt and Az for a range of observing times and dates, but as it stands it asks for the date (day and month only, since 1986 is assumed) and the local time (in hours and minutes). The program displays Alt and Az, asks for another date/time pair, and terminates when either the day or month is zero. Since the task of computing the RA, Dec, Alt and Az is performed in discrete modules here, you shouldn't have any trouble redesigning the program for ▶

```
HalleyAltaz
     +----------------------------+
     | Call Initialise            |
     | Call SetDate               |
     | While Month<>0 AND Day<>0  |
     | +--------------------------|
     | | Call SetTime             |
     | | Call CalcRADec           |
     | | Call CalcAltaz           |
     | | Call SetDate             |
     |-----------------------------|
     | system                     |
     +----------------------------+
```

Figure 1. *The main program for generating Altaz co-ordinates for Halley's comet (1986 apparition).*

```
Initialise
+-----------------------------------------------------------+
| PI = 3.141593                                             |
| G = PI/180          'Conversion factor degrees to radians |
| H = PI/12           'Conversion factor hours to radians   |
| Lat = -33.717*G     'Sydney NSW                           |
| Long = -150.25      'Sydney's longitude                   |
| CL = cos(Lat):      SL = sin(Lat)  'for CalcAltaz         |
| Dif = 10            'Hours ahead of GMT (Sydney)          |
| NW = 31             'Number of weeks supported in table   |
| DIM COORD(2,NW)     'Ra(NW), Dec(NW)                      |
| For i = 1 to NW                                           |
| +---------------------------------------------------------|
| | read COORD(1,i), COORD(2,i)  ' in hours and degrees     |
| | COORD(1,i)=COORD(1,i)*H    'Ra now in radians           |
| | COORD(2,i)=COORD(2,i)*G    'Dec also now in radians     |
|-----------------------------------------------------------|
| cls  'clear the screen in readiness for first entry       |
| print "          HALLEY LOCATOR   -   1986"               |
| print "This program operates from 1 March to 31 July."    |
| print "Exit by entering 0 for day or month.               |
| print                                                     |
+-----------------------------------------------------------+
```

Figure 2. *Initialise sets up the site parameters and the* RA/Dec *table. The data statements used by the read statement are in the module called* Data.

```
SetDate
+-----------------------------------------------------------+
| print                                                     |
| input "Day (1 to 31) and month (1 to 12)"; Day, Month     |
| WHILE (Month < 3 OR Month > 7) AND Month <> 0             |
| +---------------------------------------------------------|
| | beep                                                    |
| | print "Month must be in the range 3 to 7."              |
| | input "Day and month";Day, Month                        |
+-----------------------------------------------------------+
```

Figure 3. *This module accepts the date from the user and checks the month for validity.*

```
SetTime
+-----------------------------------------------------------+
| input "Local time (hrs and mins as DD.DD)";TOD            |
| Day = Day+int(TOD)/24+(TOD-int(TOD))*100/1440-Dif/24      |
| DAT = int(30.6001*(Month+1))+Day-123 'Day of year         |
| REM  DAT 0.0 is 0Hrs GMT March 1 1986                     |
|-----------------------------------------------------------|
| REM Compute local sidereal time (needed for CalcAltaz)    |
| sid# = 0.440293 + DAT/365.2422                            |
| sid# = 24*(sid#-int(sid#))                                |
| sid# = sid# + 24.0657098*(Day-int(Day)) 'Greenwich        |
| sid# = sid# - Long/15  'local sidereal time in hrs        |
| sid# = sid# * H  'convert to radians                      |
+-----------------------------------------------------------+
```

Figure 4. *SetTime accepts the local time and adjusts* DAT *relative to* March 1.0. *It also computes local sidereal time for the observing site. Sidereal time is 'star time', as opposed to normal solar-based time. This is needed for the conversion from* RA *and* Dec *to* Altaz *co-ordinates.*

```
CalcRADec
+-----------------------------------------------------------+
| REM Compute current RA and Dec (as RA and Dec) from tables|
| REM using cubic interpolation.  The entries in the COORD  |
| REM table are from Feb 1 at GMT 0 at weekly intervals.    |
| REM DAT=0 corresponds to the entry for March 1.           |
| N=1  'Specify RA for the Interpolate module               |
| Call Interpolate                                          |
| RA = X   'Interpolate sets value in X                     |
| print "   Right Ascension: ";RA/H                         |
| N=2  'Specify Declination                                 |
| Call Interpolate                                          |
| Dec = X                                                   |
| If Dec > PI                                               |
| +---------------------------------------------------------|
| | Dec = Dec - 2*PI  'should lie between + and - PI/2      |
|-----------------------------------------------------------|
| print "Declination:       ";Dec/G   'as degrees           |
+-----------------------------------------------------------+
```

Figure 5. RA *and* Dec *are calculated by interpolation, using the module* Interpolate (*see* Figure 6). *It must be given the parameter* N, *which is* 1 *for* RA *and* 2 *for* Dec. *The result is returned in* X (*in radians*).

```
Interpolate
+-----------------------------------------------------------+
| REM Cubic interpolation                                   |
| Z=DAT+36                                                  |
| W=int((DAT)/7)+6  'week number (must be >2)               |
| X1=W-2: X2=W-1: X3=W: X4=W+1                              |
| K=-COORD(N,X1)+2*COORD(N,X2)-COORD(N,X3)                  |
| L=2*X2*X2-X1*X1-X3*X3                                     |
| M=2*X2*X2*X2-X1*X1*X1-X3*X3*X3                            |
| R=2*COORD(N,X3)-COORD(N,X2)-COORD(N,X4)                   |
| P=2*X3*X3-X2*X2-X4*X4                                     |
| Q=2*X3*X3*X3-X2*X2*X2-X4*X4*X4                            |
| D=(K*P-R*L)/(M*P-Q*L)                                     |
| C=(K-D*M)/L                                               |
| B=-COORD(N,X1)+COORD(N,X2)+C*(X1*X1-X2*X2)+D*(X1*X1*X1-X2*X2*X2)|
| A=COORD(N,X1)-B*X1-C*X1*X1-D*X1*X1*X1                     |
| X=(DAT)/7+5                                               |
| X=A+B*X+C*X*X+D*X*X*X                                     |
| If X<0                                                    |
| +---------------------------------------------------------|
| | X=X+2*PI                                                |
+-----------------------------------------------------------+
```

Figure 6. *The* Interpolate *module uses a method known as 'cubic interpolation' to determine intermediate values for either* RA *or* Dec *from the table in* COORD. *The element is selected by* N (1 *or* 2) *and the result returned in* X.

```
+-----------------------------------------------------------+
| REM Convert RA and Dec to Altaz and display               |   CalcAltaz
| ha = sid#-RA  'hour angle                                 |
| zd = SL*sin(Dec)+CL*cos(Dec)*cos(ha) 'zenith distance     |
| zz = atn(sqr(1/zd/zd-1))                                  |
| If zd<0                                                   |
| +---------------------------------------------------------|
| | zd=PI-zz    |   zd=zz                                   |
|-----------------------------------------------------------|
| ca=(cos(Dec)*SL*cos(ha)-sin(Dec)*CL)/sin(zd)              |
| sa=cos(Dec)*sin(ha)/sin(zd)                               |
| Az=atn(sa/ca)                                             |
| If ca<0                                                   |
| +---------------------------------------------------------|
| | Az=Az+PI    | If sa < 0                                 |
| |             | +-------------------------------------------|
| |             | | Az = Az + 2*PI                          |
|-----------------------------------------------------------|
| Az=Az-PI                                                  |
| If Az<0                                                   |
| +---------------------------------------------------------|
| | Az=Az+2*PI                                              |
|-----------------------------------------------------------|
| Az=Az/G: Alt=90-zd/G                                      |
| print "   Azimuth:          ";Az                         |
| print "   Altitude:         ";Alt                        |
+-----------------------------------------------------------+
```

Figure 7. *CalcAltaz computes the altazimuth co-ordinates from* RA *and* Dec *given the site location* (Lat *and* Long) *and the sidereal time* (*sid#*).

generating listings for selected viewing periods — that's one of the nice aspects of structured programming.

The main program is shown in Figure 1. Here's what the various subroutines are supposed to do.

Initialise (Figure 2) sets up the latitude and longitude for the observing site, and prepares the screen. It also sets the offset for local time compared with GMT.

SetDate (Figure 3) collects the numeric variables Day and Month from the keyboard. If either of these values is zero, the program terminates.

SetTime (Figure 4) asks for the local time and converts it to GMT, then uses this value to adjust the date (DAT) with an appropriate fractional value.

CalcRADec (Figure 5) uses the DAT value to work out RA and Dec from the tables using cubic interpolation, and CalcAltaz generates the values of Alt and Az from RA and Dec, and displays them on the console.

Gutsy

The most complex part of this program is the cubic interpolation of CalcRADec (actually performed in the module Interpolate in Figure 6), and CalcAltaz is also a bit daunting. Don't worry too much about the innards of these two routines, unless you're into numerical analysis and/or astronomy. The program may be a little inaccurate, but considering the size of the comet this is not likely to be a problem.

If your observing site is not in Sydney you will need to adjust the values for lines 4, 5 and 7 in the Initialise module.

The SetDate module accepts day and month as a pair of integers separated by a comma. The range check in the WHILE statement ensures that Month lies in the range March to July (unless it's zero, which indicates a request to terminate the program). The structure of this module is typical for the job of accepting a value and checking for validity.

SetTime accepts your local time (daylight saving is ignored) to generate two values: Day and DAT. Both are used in the calculation of the local sidereal time (time measured by the stars as distinct from time measured by the sun), sid#, which follows. The sidereal time is needed for the conversion from RA and Dec co-ordinates to the Altaz system. Roughly speaking, when a given star is directly overhead (on the meridian) the sidereal time corresponds to its RA. For example, whenever Sirius is on the meridian, the sidereal time is 6.44 am.

This program illustrates the principles of dealing with individual requests for a fairly complex calculation. The design involves top-down modular programming, where the first considerations are for the input data and the loop terminating condition. □

Before you buy the new Osborne Computer, look into it carefully.

There's an old saying. "Never judge a book by its cover." The same is true of micro-computers. They all look virtually identical.

The new Osborne 2000 is a prime example. Outside it could be IBM, NEC or Sperry. Inside it's very different.

Open it and look inside. The lid is hinged for instant access. Note the rugged, reinforced chassis.

The drives are Epson – the world's best. Examine the boards. Unlike other micro-computers, they're not hand soldered. Flow soldered instead, they have dramatically improved reliability.

It's just one reason Osborne gives its mother boards a two-year guarantee.

Run your fingers across the keyboard. Australian Computing recently described it as "One of the best keyboards ever laid hands on – it rates at least 9 out of 10."

Since 1979, more than 250,000 Osborne computers have been sold. It was the first micro brand sold here. The Australian user base is over 15,000. Prominent amongst them are accountants, teachers and academics.

The Osborne 2000 is a powerful desk top computer. In capacity and performance it compares closely with the IBM XT. In many respects, it's much better.

The Osborne 2000 has 640 Kb of main memory – the absolute maximum available with MS-DOS. A ten megabyte hard disk is standard. And factory fitted 20, 40 and 160 megabytre hard disks are available. With eight expansion slots and three monitor ports, the new Osborne can be multi-user, part of a Local Area Network and connected to a core memory. It will drive printers, plotters and bar code readers.

Experience shows the Osborne 2000 has a down time of under .003%. By now you will realise, despite appearances, the Osborne is very different to other micro-computers. But don't take our word for it, look into it for yourself.

For more information on the remarkable new Osborne 2000 range and the name of your nearest Osborne dealer, call us today. Or fill in the coupon below.

— — — — — — — — — — — —

Dear Osborne. I'm keen to look into the new Osborne 2000. Send me your free brochure and the name of my nearest dealer.

Name: _____

Position: _____ Company: _____

Address: _____

_____ Phone: _____

The Osborne 2000. You really must look into it.

— — — — — — — — — — — — YC

Osborne.

Osborne Australia Sydney Office: 93 York Street, Sydney NSW 2000. Telephone: 2901122. FAX: 2901558. Telex: AA70510.
Melbourne Office: 260 Auburn Road, Hawthorn Vic. 3122. Telephone: 8191050.

Brand Management OSCO1019

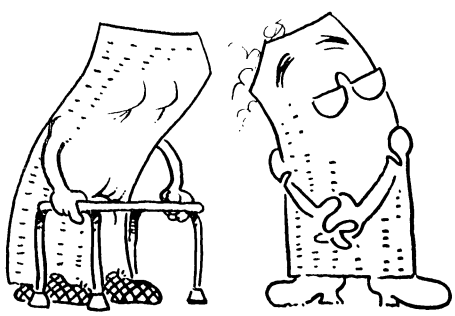
COMPUTING FOR BIRDWATCHERS
Part 4 — Mass Storage

In his bid to make all clear in the world of computing, Les Bell continues his beginners' guide to hackers' heaven. This month he elucidates the mysteries of mass storage.

LAST MONTH we looked at I/O ports, and the way the machine communicates with the outside world. This is essential for entering data and obtaining results; however, we only alluded to the fact that that's how programs, as well as data, get into the computer's memory.

Now, retyping a program into the computer every time you want to use it would render the machine massively inefficient for most uses, and would obviously make it useless as a means of storing information. So there has to be some kind of storage attached to the computer for these purposes.

In the early days this wasn't so important, since the computer's memory usually consisted of rings of ferrite, a magnetic material, which retains its contents even when the power is switched off. Consequently, there was no need to reload programs after the machine had been powered down.



VENERABLY AGED PUNCHED CARDS....

More recent machines, however, have used solid-state semiconductor memory, which needs power applied at all times to hold its contents. When the machine is switched off, therefore, the contents of memory are lost. In this situation, there has to be some form of mass storage from which programs are reloaded.

The earliest common form of mass storage was the punched card, derived from earlier 'programmable' Jacquard weaving looms. Such cards have 80 columns which can store individual characters, and this has given rise to the use of 80-column-wide printers and displays. Despite their venerable age and the introduction of much faster and better forms of mass storage, punched cards are still in commercial use — I recently came across a bank in Victoria that uses them.

After punched cards came punched paper tape, which has rows of eight holes suitable for storing ASCII characters. Paper tape only died out during the late Seventies, primarily due to the introduction, by IBM (who else?), of the floppy disk.

Divine Disks

The floppy disk appeared as part of the System/370 mainframe series. When a computer is first powered up, its memory is empty, or rather, full of garbage, and it has no program to run. The first program ('bootstrap') which must be loaded is itself a loader which can read in other programs (most notably the operating system) from whatever mass storage is available.

MAINFRAME DISK DRIVES LOOK RATHER LIKE TOP LOADING WASHING MACHINES....

In the early days, this was paper tape, and I can still remember starting up a PDP-8 minicomputer this way. With the advent of the /370, however, IBM was seeking a faster way to load the bootstrap and complex diagnostic programs for testing the computer system. It came up with the floppy disk, a flexible Mylar disk with a magnetic coating which can be written to and read by recording heads, rather like a combination of record player and tape recorder.

For some time, the standard for floppy disks was the 20 cm size, with a magnetic pattern called the format laid onto it; this was specified by IBM and is called the 3740 format. It has a storage capacity of 250 Kbytes. Later enhancements for the System/34 computer more than quadrupled the capacity, to 1.2 Mbytes.

The advantages of the floppy disk over earlier storage media are increased robustness and reliability (paper tape tears easily), higher capacity, and the ability to read randomly any area on the disk. Speed is also much higher.

The trouble with the 20 cm drive is that it is relatively expensive, not to mention large. In the late Seventies Shugart Associates developed a smaller, cheaper version using a 13 cm disk, which is currently the most prevalent type. Today there are also 9 cm, 8.25 cm, 9.9 cm and other sizes of disks.

The idea of spinning disks with a magnetic read/write head was not new with the floppy disk. For some years, the main form of mass storage on mainframes was magnetic tape. Just about every science-fiction movie had the obligatory room full of spinning reels to symbolise the omniscient thinking machine. The trouble with magnetic tape is that, even with fast for-

ward scanning and rewind, it is still difficult to find one particular item of data on the tape. The computer must start at the beginning of the tape and work its way to the end, a process known as sequential access.

Tape drives are coming back into style these days, though they are no longer the giant reel-to-reel types used on mainframes. Since hard disks on PCs are non-removable, their contents must be backed up to guard against accidental damage. A tape is ideal for this purpose.

Despite this restriction, some very effective systems have been constructed using sequential files on tape drives — particularly if several drives are available. Nonetheless, these are mainly batch-oriented systems, in which the computer performs one task after another in a set order, and there is no on-line access to data files.

On-line Access

In order to make direct access to data feasible, to allow on-line enquiries of databases, tape has largely given way to the random access capability of the disk. Mainframe system disk drives look rather like top-loading washing machines, in which interchangeable disk packs (of hundreds of Mbytes' capacity) are inserted from the top. These disk drives are attached to the I/O channel processor of the machine for high performance.

The disk packs have several disks mounted internally on a single spindle, and the read-write heads, which are retracted into the drive while the pack is being mounted, have to align very precisely with the disk platters. In fact, in order to achieve the precise spacing above the disk surface which is required, the head arm is aerodynamically designed so it 'flies' above the disk surface on a stream of air. Should the disk be warped, or the air flow fail, so that the head scrapes the surface of the disk, it can do irreparable damage, a situation known as a 'head crash'.

Realising the precise matching of the disk platter and the heads is a major cost and reliability factor, IBM developed a new form of disk cartridge pack, in which the heads are not part of the drive, but part of the disk pack, simplifying construction and improving reliability.

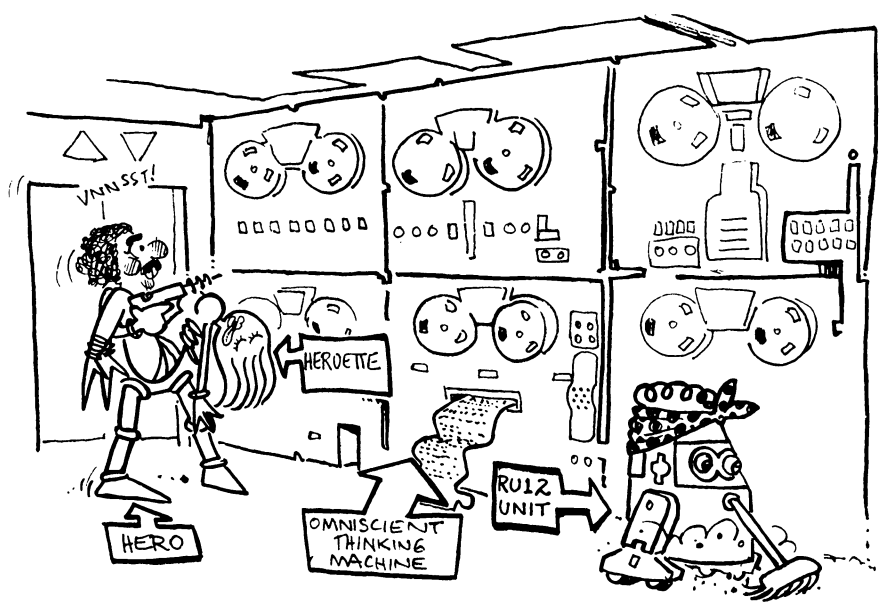
This form of disk drive, in which the disk platters and heads are sealed from the outside world, is known as a Winchester drive. As the number of personal computers sold to business has increased, so the demand for similar technology has increased and the price of these disks has dropped. Today, 20 Mbyte hard disks, based on Winchester technology, are the norm for PCs.

Any Port . . .

All forms of mass storage connect to the computer through some form of I/O port. In the case of paper tape and punched card readers, this is usually a parallel or serial port, while for disk drives (both hard and floppy) it depends on the size of the computer and the performance required. Some hard disk controllers simply interface through a parallel port, while others mount inside the computer.

In the latter case, typically with floppy disk controllers and often with hard disks, the controller accepts commands and returns data through a series of memory locations which are actually I/O ports. The computer's CPU has to run around in a tight loop, reading bytes of data and stashing them into successive memory locations.

For higher performance, many computers now use a technique called DMA (direct memory access), in which the disk controller has its own processor (in effect an I/O channel controller) which performs all I/O operations. When data is read, it directly transfers it into the main CPU's memory, while the main CPU is doing something else. This gives the highest performance, particularly on multi-user systems (on a single-user system, the▶



JUST ABOUT EVERY SCIENCE FICTION MOVIE HAD THE OBLIGATORY ROOM FULL OF SPINNING REELS TO SYMBOLISE THE OMNISCIENT THINKING MACHINE....

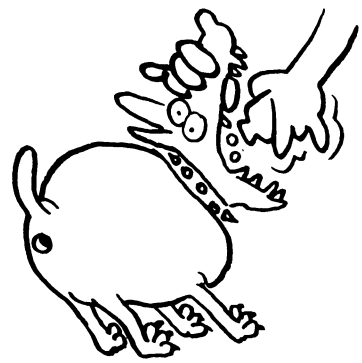
main CPU is usually waiting for the disk transfer to finish anyway).

Tape drives are coming back into style these days, though they are no longer the giant reel-to-reel types used on mainframes. Since hard disks on PCs are non-removable (unlike Winchesters on mainframes), their contents must be backed up to guard against accidental damage. Since this involves simply writing the disk contents out (and, hopefully, never having to read them back in again), a tape is ideal for this purpose.

Today's tape drives are based on tape cartridges, some of them smaller than audio cassettes, which can store 10 Mbytes or even 35 Mbytes of data with high reliability. They are by far the best way to back up fixed disks, since they are automatic in operation and require no manual intervention. Back-up methods which require the user to feed floppy disks into the machine tend to fall into disuse.

Of course, removable hard disk packs are available for PCs, and these are an alternative solution to the back-up problem — although if they are used on-line and not just for back-up, they should themselves be backed up.

Other forms of mass storage are starting to appear. One that appears to have a lot of promise in the short term is the so-called CD ROM technology. This is based upon the now familiar compact disc, which is read by a laser beam and sophisticated electro-optics. CD ROM stands for Compact Disc — Read-Only Memory, which signifies the disk can only be read, not written to. However, it has some interesting applications, including storing large on-line databases such as dictionaries. Already, in the United States, one can buy a CD ROM disk containing all the public domain software for the IBM PC on one disk.



Writable optical disks are also available; these are described as WORM technology (write once — read many). Rather like punched paper tape, in that once a character has been punched, there's no way you can change it back again (short of lots of fiddling with sticky tape, that is!), WORM disks can be written to once and then read many times.

Currently available WORM disks have capacities ranging from 200 Mbytes to 2 Gbytes (two billion characters). With the larger disks, updating a file is no problem: just write out a new version and completely burn out the old area of the disk! With such huge capacity to play with, it will be a long time before you fill the disk anyway.

Next month, we'll look at the software aspects of computing systems, starting with the operating system. □

Breeze
Point Of Sale Software
Increased Profit for Retailers

BREEZE SOFTWARE

The Breeze Point of Sale Software combined with a micro computer replaces the humble cash register, right at the point of sale.
Breeze not only handles normal cash register functions ***FASTER*** *and* ***MORE EFFICIENTLY*** *than a cash register but also provides essential accounting control, and vital management reporting right at your fingertips.*
Designed for fast customer service and simplicity. Your most junior sales clerk will find Breeze ***EASY TO USE.***

FEATURES:

- ☐ Comprehensive Inventory Control
- ☐ Comprehensive Accounts Control
- ☐ Comprehensive Product Sales Analysis
- ☐ Detailed Sales Reporting by Sales Person
- ☐ Detailed Sales Tax Reporting
- ☐ Interfaces with the Breeze General Ledger/Accounts Payable/Purchase Ordering System

BENEFITS:

- ☐ Minimises Over Stocking and Under Stocking
- ☐ Better Control Over Outstanding Accounts
- ☐ Better Control Over Margins and Sales Mix
- ☐ Better Control Over Sales Staff and Comissions
- ☐ Reduces Administration for Sales Tax Claims
- ☐ Fully automates your Retail Business from purchases, to Sales, to Balance Sheet and Profit & Loss Statement

Available on:- IBM, Wang, Olivetti, NCR, Sharp, NEC and IBM compatible personal computers.

Ring now for the Breeze Software dealer nearest you.

Breeze Software (Aust) Pty. Ltd. P.O. Box 1220, Geelong, Vic. 3220. Ph (052) 21 6144

Bring your retail business into the 80's.

C FOR SMARTIES

Part 7

Les Bell continues his series on C Programming with the most difficult part of all — if you can get through this, you'll have no worries!

Normally if you ask someone to count to ten, they will reply, "One, two, three . . . ten." Ask a real programmer to count to ten and he or she will say, "Zero, one, two, three . . . ten." Some languages (particularly ANSI BASIC) *start all array subscripts at one. Some* (Microsoft BASIC) *offer you the choice, and* PL/I *lets you have arrays with subscript ranges beginning and ending anywhere you like, but* C *starts all arrays at subscript zero.*

THIS MONTH, I want to tackle the most complex part of C programming: pointers. First, however, we should take a look at arrays in C, since pointers and arrays are really just different facets of the same underlying mechanisms.

Arrays

So far, we have looked at the basic types provided by the C language: chars, ints, floats and variations thereon. C also offers us the ability to build upon these types to make various data structures.

The commonest data structure is the array, which is used to store a number of related variables under one name. For example, we might want to store one year's average humidity figures. We normally present related data such as these in tabular form (see Table 1).

We speak of having one variable (humidity) and an index (the name of the month) which extracts the appropriate figure. C, like most computer languages, does not let us use a month name as an index, so we must use a number instead (see Table 2).

The month number is called a **subscript**, and the whole table is called an array.

Notice the subscripts start from zero. Normally if you ask someone to count to ten, they will reply, "One, two, three . . . ten." Ask a real programmer to count to ten and he or she will say, "Zero, one, two, three . . . ten." Some languages (particularly ANSI BASIC) start all array subscripts at one. Some (Microsoft BASIC) offer you the choice, and PL/I lets you have arrays with subscript ranges beginning and ending anywhere you like, but C starts all arrays at subscript zero.

To declare such an array in C, we specify the number of items in the array, which will be the highest subscript plus one. And of course, arrays have a type, just like their component parts. So:

```
float humidity[12];
```

will create an array as in Table 3, with, of course, no valid contents to begin with (depending upon the compiler and linker used, it will contain either zeros or random garbage).

Exercise

Examine Listing 1, which calculates the average humidity of Sydney over a period of a year. Run it and feed it the following data:

	Sydney	Melbourne
January	68	61
February	71	65
March	72	67
April	70	71
May	70	77
June	73	81
July	68	80
August	66	75
September	63	69
October	61	64
November	62	62
December	65	61

Which city is, on average, more humid?

```
/* Average humidity calculation */

main()
{
        float total, humidity[12];
        int i;

        for (i = 0; i < 12; i++) {
                printf("Humidity for month %d? ",i);
                scanf("%f",&humidity[i]);
```

Listing 1.

Table 1. *Sydney average relative humidity at 9 am (per cent).*

Month	Jan	Feb	Mar	Apr	May	Jun	J~ t	Nov	Dec
Humidity	68	71	72	70	70	73	~	62	65

Table 2.

Month No.	0	1	2	3	4	5	~	10	11
Humidity	68	71	72	70	70	73	~	62	65

Table 3.

Subscript	0	1	2	3	4	5	~	10	11
humidity							~		

Counting Formula

An array is simply a block of storage which contains a series of values, one after the other. The C compiler knows where this block of memory is located, and is able to identify and extract any element of the array by 'counting over' the intervening elements of the array. It actually uses a simple formula to do this:

address of element n = base address of array + (n) times the size of an array element, where n starts from zero.

An array is simply a block of storage which contains a series of values, one after the other. The C compiler knows where this block of memory is located, and is able to identify and extract any element of the array by 'counting over' the intervening elements of the array.

Notice C performs no array bounds checking: if you declare an array int i[10], and then refer to i[25], the compiler just plugs 25 into that formula and extracts what it finds at the corresponding location in memory, right or wrong.

In actual fact, an array name is the address of the zeroth element of the array. So if we write:

```
#define NAMELEN 40
char namebuf[NAMELEN];
gets(namebuf,NAMELEN);
```

the parameter we are passing to the gets function, namebuf, is actually the address where we want the input to be stored, since namebuf is the address of the zeroth element of the array. In other words:

namebuf <=> &namebuf[0]

This is why you cannot (or rather, should not) write a statement like:

```
namebuf = "John Brown";
```

There are two things wrong with this statement. At first sight, it looks like the programmer is storing the string "John Brown" in namebuf. However, namebuf is ▶

a constant, not a variable, and contains the address of the name buffer, not the characters themselves. And secondly, C does not allow operations on entire arrays (or other aggregate types), including assignment, passing them as parameters, or returning them from functions. As we shall see later, copying strings has to be done using the strcpy function.

Let's now look at pointers, which are related to arrays.

Pointers

Pointers are absolutely essential to C programming. Without pointers, C would be nowhere near as powerful, flexible or popular. On the other hand, pointers make C difficult to understand, difficult to maintain and more prone to bugs. In this respect, they are rather like macros in dBase, only more so.

When a program is compiled, the compiler reserves space for each variable and converts references to a particular variable name into references to the appropriate location in memory. Thus, references to the int variable fred are converted into two-byte (one word) accesses to some location in memory. The compiler knows, at compile time, where the variable is to be stored, and refers to that address.

However, there are times when we may want to refer to a variable, but we don't yet know where it will be located in memory. Take the design of a spreadsheet, for example. We want to have as much of memory as is left over after the program available for the spreadsheet data itself. In this situation, we can't simply create an array of spreadsheet cells, since on some machines the array would be too big to fit into memory and on others it would not use all the available memory.

What we want to do is to be able to create new variables in memory as the program runs, using the memory left over after the program. We don't know how many variables we will be able to create at compile time, nor are we able to name them.

Fortunately, the C language includes memory management functions which enable us to create variables as required, until memory is full. But how, though, can we access unnamed variables at some arbitrary location in memory?

We have to have some alternative mechanism to variable names for getting access to data. Such a mechanism is the pointer.

Pointers are variables which contain **the address of another variable**. The actual size of a pointer depends on the type of machine it is running on, and in the case of the 8086 processor, the 'memory model' of the program. However, it is generally conceptually helpful — at least at first — to think of a pointer as being equivalent to an unsigned integer. In practical terms, though, this is dangerous, since a pointer and an integer are not always the same thing, and building this assumption into your programs can cause severe difficulties in porting them between machines.

You could think of the address of a variable in a typical machine as being between 0 and 65535, which could be stored in an unsigned int. For an 8086-based 16-bit machine like the IBM PC, pointers can be either 16-bit or 32-bit, as we shall see later.

You declare a pointer by placing an asterisk in front of the variable name, and defining its type in the usual way. Pointers are typed like other variables (incidentally, they weren't typed in B, the predecessor to C). Look at these declarations:

```
int *ip; /* pointer to int variable */
char *cp; /* pointer to char variable */
float *fp; /* pointer to float variable */
```

These declarations all reserve space for a pointer (generally the same size as unsigned int) and do *not* reserve space for an int, a char or a float variable respectively. The variable the pointer points to has to be declared separately, or the memory space it will occupy obtained in some other way.

Once the pointer is pointing somewhere valid (that is, you have stored the address of some other variable in it) you can refer to two objects by using the pointer name. One is the pointer itself. For instance, in the example above, ip is a pointer, of type pointer to integer. The other object is *ip, which is the variable which ip points to, and is of type integer.

Think of it this way: the declaration

```
int *ip;
```

tells you two things:

```
int (*ip) => *ip is an integer
(int *)ip => ip is an integer pointer
```

The pointer has a specific type associated with it, and this makes a difference to the way 'pseudo arithmetic' operators work on it. For example, look at the code extract in Listing 2.

Since an integer is stored in two bytes, and microprocessors are byte-addressable, integers are stored two bytes apart. Incrementing a pointer does not add one to it, as is the case with an integer; instead ▶

TURBO FAMILY

Get your PC really moving

$105.00

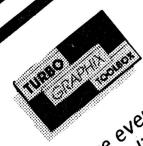
TURBO PASCAL 3.0

With over 250,000 users worldwide Turbo Pascal is the industry's de facto standard. And now, with version 3.0, the world's fastest Pascal compiler is twice as fast! A full-screen interactive editor is built-in and for IBM PC versions we've included turtle graphics and full tree directory support. Available for most computers running PC DOS, MS DOS, CP/M 80 or CP/M 86. and you pay no royalties! Turbo Pascal $105.00 Turbo BCD/8087 $199.95 Turbo 87 $176.95 Turbo BCD $176.95

$99.95

GRAPHIX TOOLBOX

The Turbo Graphix Toolbox will give even a beginning programmer the expert's edge in dazzling graphics on the IBM PC. It's a complete library of Pascal procedures including window management; tools that let you draw and hatch graphs and shapes; procedures that save and restore graphic images to and from disk; curve plotting functions; animation tools and lots more. You get commented ready to go source code for all these functions. The price? Just $99.95. And no royalties!



TOOLBOX™

The perfect complement to Turbo Pascal, Turbo Toolbox gives you three fundamental utilities: Turbo-ISAM files using B+ trees; Turbo Sort, and GINST (General Installation Program). You get fully documented source code for these essential utilities. Ready to incorporate in your own programs – modified or as they are. Toolbox also includes the source code for a complete ready to compile and run database. You get all this for just $96.95 How's that for value?

$99.95

SIDEKICK™

Infoworld's (USA) Software Product of the Year. Now whether you're working in your word processor, spreadsheet, database – whatever, Sidekick will be there. Giving you a notepad, appointment calendar, calculator, phone directory and ASCII table. All instantly available without leaving the program you're working in. Just think how much more use you'll get out of your PC with Sidekick. Yours for just $99.95 (copy protected). Non-copy protected $129.95

$67.95

Turbo Tutor

The Pascal tutor for everyone from novice to expert. Even if you've never programmed before, Turbo Tutor will get you started right away. If you already have some experience with Pascal or another programming language, Turbo Tutor will take you step by step through topics like data structures and pointers. If you're an expert, you'll love the sections like "How to use assembly language routines with your Turbo Pascal programs." All the examples in the book are included as source code on the disk – ready to compile. And it costs just $67.95

Please send me more information on the Turbo Family products I've ticked and the name of my nearest dealer.

- ☐ Turbo Pascal 3.0
- ☐ Turbo Toolbox
- ☐ Graphix Toolbox
- ☐ Turbo Tutor
- ☐ Sidekick

Name: _____

Address: _____

Postcode: _____

Computer: _____

Software Source Pty Ltd
SYDNEY, NSW

Distributed by
Software Source Pty Ltd
PO Box 311 Bondi Junction
2022 Call for your
nearest dealer
(02) 389 6388

Glover & Assoc. 5798

it makes the pointer point to the next variable of the appropriate type. If *ip was of type char, then incrementing ip would add one to it, while if *ip is of type float, ip++ will probably add five to ip.

The syntax of pointer declarations must be examined carefully. There are two operators involved.

int *p;

declares a pointer to an integer. p is the pointer; *p is the integer that is pointed to. Thus:

```
p++;        /* Move pointer to
               next variable */

*p++;       /* Move pointer to
               next variable (++
               and * */
               /* associate right
               to left) */

(*p)+;      /* Increment the
               integer which p
               points to */
```

The * operator thus means 'contents of address'. Notice also that the '++' (increment) operator binds higher than the pointer operator. The other operator is &, which means 'take the address of'.

Have a look at the program in Listing 3. Try it now: what should it print for i, and why? What would happen if the second-last line was

(*p)++;

You should get an answer of

i = 5

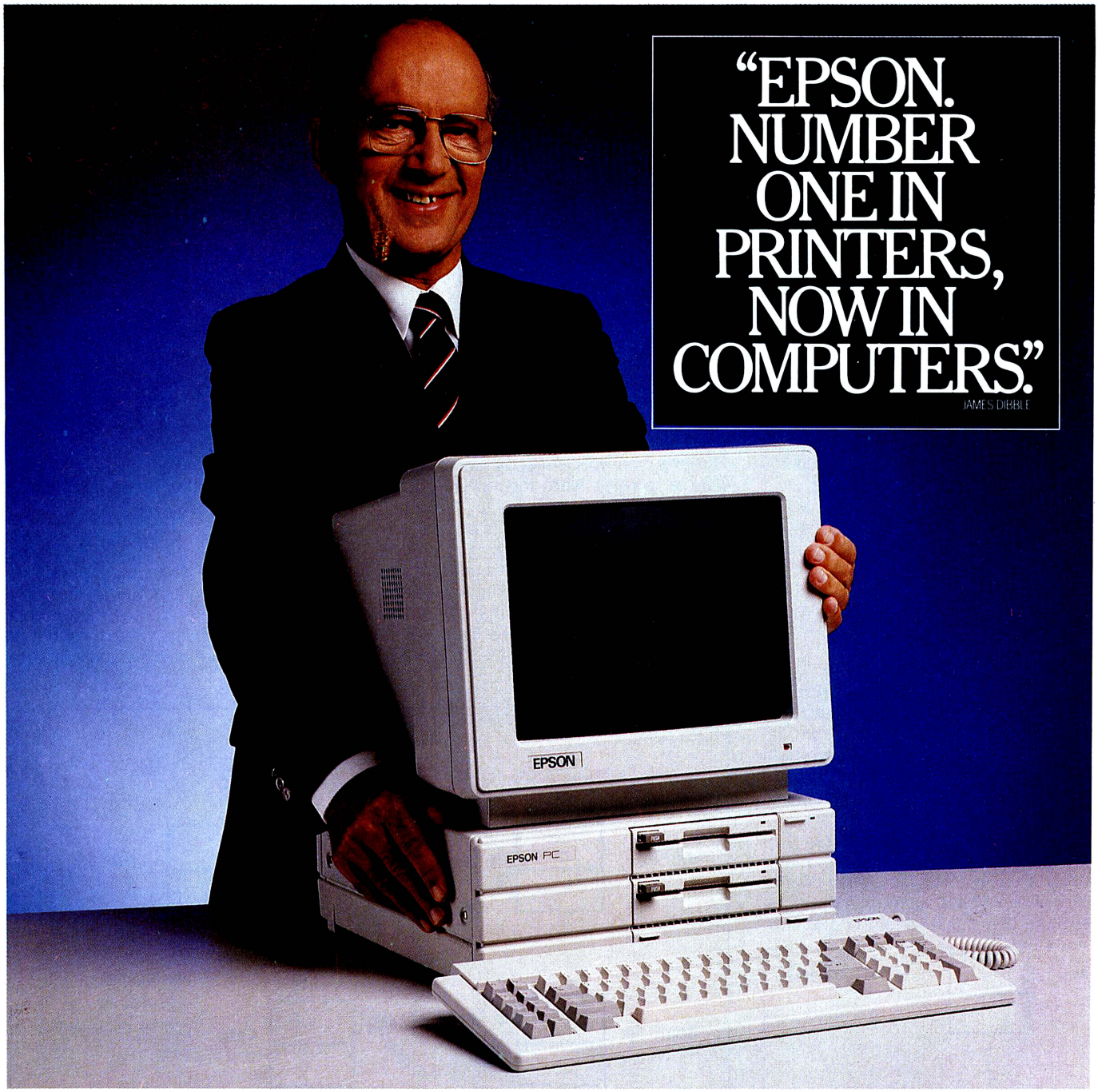
for the first run of the program. The reason is that, as mentioned above, the ++ ▶

Listing 2.

```
int i;      /* straight integer */
int *ip;    /* pointer to integer */

i++;        /* Adds one to i */
ip++;       /* Makes ip point to next integer, probably by */
            /* adding two to it */
```

Listing 3.

```
int *p;   /* Reserves space for a pointer of type int */
int i;    /* Reserves space for an int */

i = 5;    /* Store the value 5 in i */
p = &i;   /* Store the address of i in p */

*p++;     /* Increment *p, which is i, right? */
printf("i = %d",i);
```



Next time you see someone using a personal computer, chances are you'll find an Epson printer beside it.

Because all over the world, more Epson printers are connected to more makes of PC than any other.

Announcing the Epson PC

Now the Epson name can also be found on a new personal computer.

Epson took the time to make a PC just as reliable as its printers.

And backed it with a twelve month warranty. which is very likely double that offered by any competitor you may have been considering.

Time, the greatest gift of all

The greatest thing Epson can promise you is more time.

With the Epson PC, time-consuming work like sales analysis, forecasts, and "what if" calculations are completed automatically, along with direct mail correspondence, running reports and monthly billing.

For documents, the Epson PC makes light work of charts, graphs and word processing.

It even takes the panic out of last minute alterations.

Compatibility, what it really means

The Epson PC was designed to be fully compatible with readily available software.

This means that whatever role you have in mind for your computer, the Epson PC will almost certainly fill it with ease.

Epson, your first choice

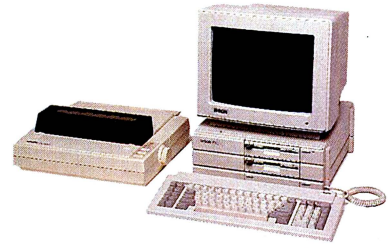
Epson became number one in printers for the simple reason that they are extremely hard to beat for features, reliability and value.

And now in personal computers, the Epson PC is a significant challenge to its competition.

It deserves your closest consideration before you buy your personal computer.

For your nearest Epson Dealer, phone Epson: Sydney – (02) 452 5222, Melbourne – (03) 543 6455, Brisbane – (07) 832 5400, Adelaide – (08) 232 0355, Perth – (09) 322 1896.

EPSON®



HOLT EPS 0040

and * operators associate from right to left (the reverse of most operators) and so the statement

*p++;

takes the address in p, increments it to the next integer, then retrieves the contents of that address and throws the result away. *p++ as a statement by itself is not really sensible and indicates misuse of pointers; it should be simply p++.

The statement

(*p)++;

uses parentheses to force the correct precedence; it retrieves the contents of the address pointed to by p, increments that value, and stores it back again.

Notice that, since the binding is dictated by precedence and not associativity, the desired result in this case can be achieved by

++*p;

since it does not matter whether *p is pre- or post-incremented.

Pointer Restrictions

Bearing in mind that pointers are completely different on different machines (and even different sometimes on the same machine), we must follow certain rules and restrict the things we can do with pointers in order to make programs which will always work.

The following operations on pointers are legal: pointer initialisation, either through assignment of some other pointer contents or address value; pointer increment and decrement; addition and subtraction of an integer to/from a pointer; comparison of two pointers (<, >, ==, !=, and so on) and subtraction of two pointers.

Addition and subtraction of pointers and integers is not only valid but also useful, and is equivalent to array subscript references; for example *(namebuf + i) is the i'th character in array namebuf (although namebuf could be a pointer rather than an array name). In other words:

p[i] <=> *(p + i)

Pointer comparisons are also useful, particularly in memory management. However, you will frequently want to compare a pointer with the special value NULL (#defined in the file "stdio.h") which is an address of zero. In general, if a pointer is not pointing to a valid object, you should set it to NULL, to indicate the fact (usually it means this pointer is at the end of a linked list, tree or similar). C guarantees a real object will never be stored at address zero; that value is reserved for the NULL pointer.

In addition, subtracting two pointers to produce an integer is useful for calculating the length of some object in memory.

In general, you cannot assign an integer value to a pointer (NULL is a special case), nor can you add them, multiply or divide them or perform any other arithmetic or logical operations on them.

Pointers in fact implement the relative and indexed addressing modes found in most modern processors from the PDP-11 on. They have many uses:

- scanning through arrays or areas of memory
- memory management
- construction of data structures such as linked lists
- string handling

We are going to concentrate next on the string handling aspects of pointers, as they show pointer operation best. Later, we'll look at their use in constructing data structures such as binary trees and linked lists, as well as use with memory management functions. □

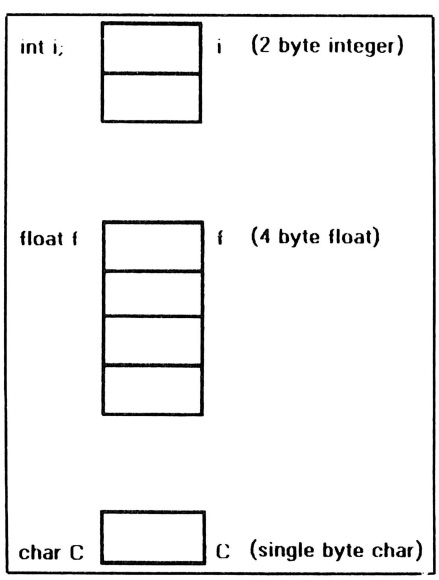


Figure 1. *Normal variable declarations showing storage reserved for variables.*

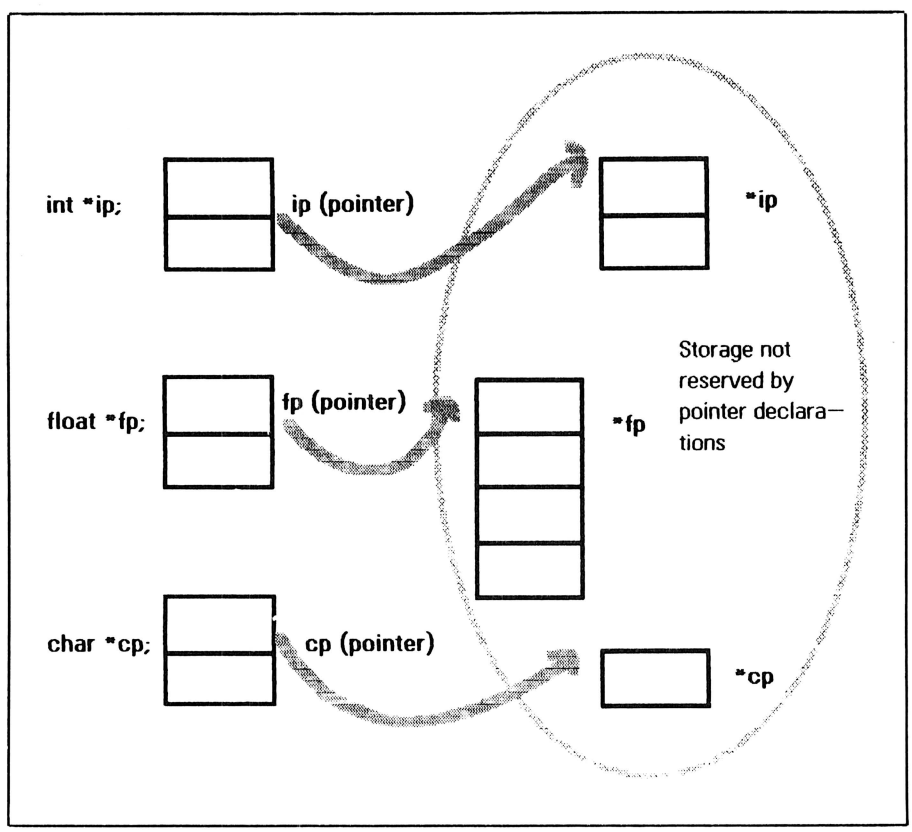


Figure 2. *Declaration of pointer variables only reserves spaces for pointers which store actual addresses of variables. Immediately after declaration, the pointers contain random addresses, and attempts to store anything where they point will usually crash the program and often the entire computer.*

PRESIDENT COMPUTERS PTY. LIMITED

We put it all together down under!

President Computers, an all Australian Company with 16 years in the office and computer equipment industry, have proudly established a computer factory at the Gold Coast, Queensland to build computers for Australians by Australians to:

PRESIDENT AUSTRALIAN STANDARD

Our features are:

STANDARD	WARRANTY 2 YEARS
STANDARD	RAM 704k PLUS REAL TIME CLOCK
STANDARD	PORTS: 2 X SERIAL 1 X PARALLEL 1 X I/O 25 PIN
STANDARD	GRAPHICS VIDEO CARD, RGB, TTL, COMPOSITE VIDEO, 14 GRAPHIC MODES
STANDARD	DUAL PROCESSOR 8088-2, 4.77 MHZ OR 8 MHZ PUSH BUTTON SELECTABLE WITH MODE INDICATOR LIGHT
STANDARD	UP FRONT RESET BUTTON AND SPEAKER
STANDARD	A.T. TYPE ENHANCED KEYBOARD WITH MODE LIGHTS
STANDARD	FLOW THROUGH VENTILATION SYSTEM WITH SILENT DYNAMIC PROFILED POWER SUPPLY WITH 4 INCH TURBO FAN AND OVERLOAD PROTECTION (FOR AUSTRALIAN CONDITIONS)
STANDARD	KEY SWITCH LOCK FOR SECURITY
STANDARD	8 EXPANSION SLOTS
STANDARD	QUALITY P.C. MOTHERBOARD MULTILAYER
STANDARD	2 EXTERNAL POWER OUTLETS FOR PRINTER, PLOTTER, MONITOR, ETC.
STANDARD	DOS 2.11 and 3.1 + FREE SOFTWARE
OPTION	OF ANY COMBINATION OF DISK DRIVES, FLOPPY, HARD DISK, TAPE BACKUP, MAXIMUM 4 INBUILT + 2 EXTERNAL

President Computers P/L H.O.
100 George Street,
Hornsby, N.S.W. 2077
(02) 476 2700

President Computers Victoria
609 St. Kilda Road,
Melbourne, Vic. 3004
(03) 529 1788

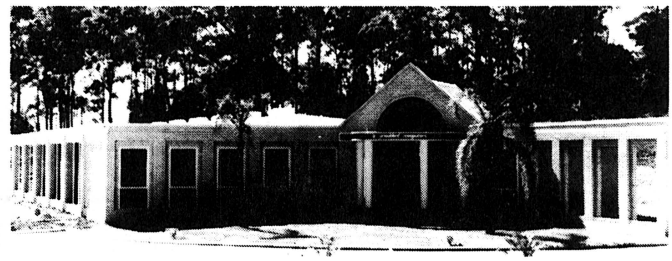
Canberra	Ph: (062) 47 3403
Darwin	(089) 81 5905
Perth	(09) 389 1226
Tasmania	(002) 34 3446
	(003) 31 8388

President Computers Qld.
54 Robertson Street,
Fortitude Valley 4006
(07) 52 3288

President Computer Factory
1 Computer Street,
Labrador, Qld. 4215
(075) 37 4641

President Computer Marketing
305 Morphett Street,
Adelaide, S.A. 5000
(08) 212 1799

THE ONLY THING NOT STANDARD IS OUR DOWN UNDER PRICE!



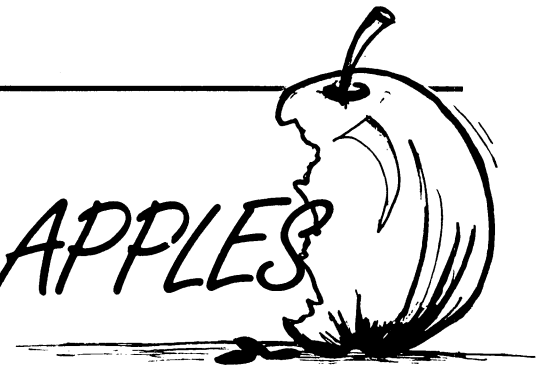
PRESIDENT COMPUTERS GOLD COAST

SUPPORT AUSTRALIAN BUSINESS

president
GOOD AS GOLD

PHONE ONE OF OUR DISTRIBUTION CENTRES FOR YOUR LOCAL DEALER

STEMWRITER FOR APPLES



THERE CAN BE little doubt the Stemwriter package is one of the best, if not *the* best, Australian-designed Apple-compatible word processors on the market. It's a great big rambling affair; a wishlist come true. It has just about every conceivable feature I could think of in it somewhere.

Stemwriter was designed by Trevor Smith of TM Systems in Brisbane. Like many a grand project, it started out because there was no suitable off-the-shelf package. Smith is a professional technical writer, and found most word processors lacking in basic features when it came to his needs. That's not altogether surprising; writers of technical reports have more demands in terms of layout, funny fonts, footnotes and so on than those of us engaged in more mundane essay writing.

So he decided to write a program aimed at engineers and others like himself with specialist needs. It would need a whole range of special features dedicated to report writing and managing a small office. Just as importantly, it would be a word processor for use by people who don't word process much — the argument being that engineers engineer, they don't sit in front of a typewriter all day. So there had to be a trade-off: ease of use against speed of use. Sometimes a little frustrating to journalists, but doubtless a godsend out in the traps.

This background goes a long way towards explaining some of the features built into this product. For example, it does sub- and superscripts, the whole upper- and lower-case Greek alphabet, bold printing (seen on-screen as inverse video) — and it underlines on the screen, in front of your eyes.

Stemwriter is also one of the very few processors around that can actually compose a complex mathematical formula on the screen, complete with sub/superscripts and all the correct symbols. Another rare feature is overprinting. It is possible to backstep and print over the previous character, to create a 'not equals' sign, for example. Special sections of text can also be marked for inclusion as footnotes during printing.

Adequate RAM

After the program has been installed in a IIc or 128 Kbyte IIe, 51 Kbytes are left for user files. Dividing by five for an approximate word count, Stemwriter can store

Jon Fairall uses an Apple with a word processor practically every day of his life, so he's the obvious person to turn to when we want a new program in this category reviewed. He was more than usually pleased with Stemwriter.

about 10,000 words in RAM. This can be divided into eight separate documents residing in memory, all capable of being accessed at the same time. Two windows can be created, in the top and bottom of the screen, so that any two of the eight documents can be on the screen at one time. It's possible to move text from one window to the other, even to 'cut and paste' a whole new document together from existing bits and pieces.

Another nice touch is the user-definable keys, which run from a to j. Each can be made to record a character string, which can be recalled simply with a combined closed-apple/selected-key action. In the default condition closed apple-d gives today's date.

Stemwriter does sub- and superscripts, the whole upper and lower case Greek alphabet, bold printing — and it underlines on the screen, in front of your eyes.

And actually using it? On first acquaintance, it's quite straightforward. Stemwriter uses a 'command line' system for control; pressing one or other of the two apple keys produces a line of communication from the machine that runs across the top of the screen. The line functions as a menu, giving the user a small number of choices, selected with the arrow key. For example, closed apple-9 causes the line:

(Moves) text by (block)

to appear. Pressing the up or down arrow will cause 'copy', 'move' and 'wipe' to cycle between the first pair of brackets until you reach the operation you need. Once the command line reads what you want, you press return. For example, to delete some text you compose the line:

(wipes) text by (blocks)

Then the program will ask for the beginning and end of the block and delete it on <return>.

The same system is used for most commands, so it's possible to get away with only using the number keys and the control keys around the periphery of the keyboard to control Stemwriter. That's a total of 26 keys — sufficiently small for you to be able to try keys at random if you get lost. If you make a mistake, <escape> will always return you to editing mode. It's a considerable improvement on learning Wordstar, where the card with all the control characters on it was elevated to the same status as the Bible.

Clumsy Commands

The Stemwriter command line system is a major bonus for neophyte word processor users, but there is a penalty as you get used to it: the commands start to look a little clumsy. To jump from the start to the end of the document, for example, you have to select open apple-8, which gives you a line reading:

(jump) to doc. (head)

If you want to go to the end of the document, you must change 'head' to 'tail' with the arrow key, and then push <return> — four keystrokes to do a simple jump. Wordstar does the same thing with three.

Whether this is a major objection to Stemwriter probably depends on the application. It could be a major impediment to someone doing lots of editing, but for more irregular users, who don't want to learn the dozens of Wordstar commands, it's ideal.

Stemwriter has a separate utilities file with some useful programs. For example, a sort routine can be used on the keywords of the database to sort it alphabetically. There is also a facility to do a word count, and all the usual file and printer management-type programs. ▶

MagicPrint $395

The basic program, **Magic Print,** performs all the print formatting functions. Simple dot commands give you precise control over document appearance with none of the "guessing" of on-screen rulers.

■ **Perfect Proportional Spacing**

```
This paragraph is printed in Courier font, without proportional
spacing. Every letter is given the same amount of space, just as
WordStar would print it. It's easy to see why true proportional
spacing is essential for professional-looking documents. But ...
```

Not all proportional spacing is created equal. Other proportional spacing programs leave unsightly gaps between words or pepper the text with hyphens. Only MagicSeries takes all the elaborate steps of a skilled typesetter to upgrade your printer from an electronic "typewriter" to a professional typesetting system. (One user in Idaho saved enough in typesetting costs on a single job to retrieve the entire price of the program.)

■ **Automatic Footnoting**

Just type in the footnotes with the related text, and the program will put them in the proper place at the bottom of the page. Or, if they are too long, the program will split them and carry the remainder over to the next page. You can mark footnotes any way you like—with numbers, "*", or a "see note" message. Footnotes have never been easier or more flexible.

■ **Automatic Column Printing**

A simple dot command is all you need to turn a block of text into neat columns. For example, **K2 3** printed this pragraph in two columns with three spaces between them. You can print columns in various configurations, print only a segment of the text in columns, or even carve out a "window" in the middle of a paragraph for photographs and illustrations.

MagicSeries even lets you "talk" to your printer.

The program relays your instructions directly to the printer to access the extra characters on printwheels, change type fonts or even draw fancy math formulae:

$$M(N-X) = \frac{n-m}{x-y}(y+z)^2$$

Other Major Features

- multi-line headers/footers
- proportional/fixed outdent
- multi-tray sheet feeder control
- instant margin setting
- "widow/orphan-line" control
- left/right indent
- variable $super_1$ $super_2$ $super_3$ sub_1 sub_2 sub_3 scripts
- global pitch variation
- local pitch setting (kerning) merges two characters (æ) or turns -- to —
- text preview on the screen
- boldface, ~~strikeout~~
- SOLID or B R O K E N underlines
- left/right flush for partial lines
- precision centering
- print-time format changes

S t r e t c h p a r t i a l l i n e s o u t t o t h e m a r g i n s

... plus much more

MagicSeries for Laser Printers

At last, MagicSeries puts high-quality desktop publishing within the reach of even the smallest businesses. With a laser printer, full control over text appearance and layout is at your fingertips.

FMS 95 Canterbury Rd, Middle Park, Victoria 3206.
Telephone: (03) 699 9899. Telex: AA 31604.

Sakata DOT MATRIX PRINTERS

Your Personal Computer Deserves the Unequalled Printer Quality of Sakata.

model SP-1200 plus

120 Characters/Sec.
Near Letter Quality.
80 characters wide.
Condensed mode is ideal for tables.
9 Graphics modes
incl QUAD density.
CLEAN SUPER / SUBSCRIPT.
Also IBM graphics
compatible.
FULL 12 MONTH
WARRANTY.

$526 with friction &
push tractor feed.

model SP-1500

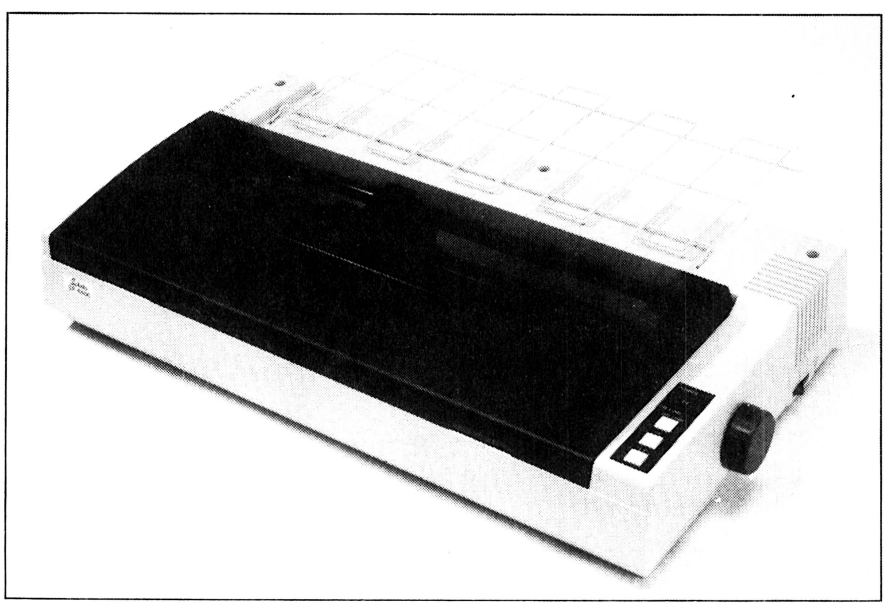
FAST 180 Chars/Sec.
Near Letter Quality.
80 characters wide.
Condensed mode, 136 Chars across.
9 Graphics modes
incl QUAD density.
CLEAR SUPER / SUBSCRIPT.
3K input buffer
Bi-directional printing.
FULL 12 MONTH
WARRANTY.

$658 with friction &
tractor feed.

model SP-5500

Professional wide carriage.
Near Letter Quality.
180 Characters/Sec.
136 Characters wide.
Condensed gives 233 chars across.
9 Graphics modes
incl QUAD density.
CRISP SUPER / SUBSCRIPT.
3K input buffer.
IBM graphics option.
FULL 12 MONTH
WARRANTY.

$910 with friction &
tractor feed.



Sakata SP-5500

Not all Japanese made printers are the same. The SAKATA range of dot matrix printers are the result of the latest technology, making them fast, quiet and above all – RELIABLE.

Both variable tractor and friction feed are standard. Character formats are of a high resolution. Draught mode features a 9 x 9 dot matrix, Near Letter Quality is made up by a 18 x 20 dot matrix and BIT IMAGE graphics can be as high as 8 x 1920 dots.

Fronts include: PICA, ELITE, DOUBLE WIDTH, Near Letter Quality, as well as DOUBLE STRIKE, proportional and super/sub script. These can be selected and mixed as required.

SAKATA printers have a parallel interface with buffer, while an optional serial interface provides up to 8KB RAM buffer.

SOLE AUSTRALIAN AGENTS

EMONA COMPUTERS PTY LTD

1st FLOOR, 720 GEORGE ST, SYDNEY, PH: (02) 212 4599 TLX AA74500

Terrific Printing

As one would expect, when it comes to printing, Stemwriter is terrific. The list of format and print options goes on and on, especially designed to suit people with tricky requirements when presenting reports. In addition to all the normal sorts of things you expect a modern word processor to do, it can print in columns, or accept an electronic template to suit printout on forms. It can do documents up to 240 characters wide, by shifting a window across the text in 40-column increments.

Naturally, there is a mailing list facility to allow you to inundate post offices with standard letters to all your friends, enemies and potential customers. Best of all, it can do background printing, which means you can continue to work on one document while Stemwriter is printing another.

The manual is, like Stemwriter itself, a monster that goes on for ever and a day. Presumably it contains everything you're ever likely to want to know, plus a lot of information most people will be able to manage without. I would have wished for a couple of simple, clear pages right up the front, telling me how to get into Stemwriter, write, save and get out again, since that's the basis of all the work you're likely to do with the program and would get you started immediately.

Otherwise, the manual seems intelligently laid out, the usual tutorial section being followed by a reference section and a close look at the utilities. I couldn't find any conspicuous omissions in the index either, which is a nice change.

Should you buy it? Stemwriter is not for everyone, but then very little in life ever is. It is certainly a state-of-the-art word processor, and at $30 or so a pop it is extraordinarily good value for money. □

RATINGS:	POOR	GOOD	V.GOOD	EXCELLENT
DOCUMENTATION			■■■■■■■■■■	
EASE OF USE		■■■■■		
DESIGN			■■■■■■■■■■	
RELIABILITY			■■■■■■■■■■	
VALUE FOR MONEY				■■■■■■■■■■■■

Distributor: Stemsoft, 31 Chiswick Road, Bordon 4065.
Price: $30.

Subscribe NOW to 'Your Computer'

ESPECIALLY SELECTED FOR YOU!

The Labtam 3004 multi-user, multi-tasking desktop computer is the system you have been waiting for. The 3004 is not just another personal computer, but a computer with the power of a mini system. The 3004 is ideally suited to a multi-user environment or in a network. Ergonomically designed, the 3004 boasts a footprint that fits well into any work situation. Engineered to Labtam's high design specifications, the 3004 is reliable and versatile; this is enhanced by many uniquely Australian computer design techniques. The Labtam 3004 runs the popular multi-user, multi-tasking operating system CCP/M with up to five users or the single-user MS-DOS. This allows access to an extensive range of application software.

MASS STORAGE DEVICES.
Standard-Two 5¼ inch floppy disks or one 5¼ inch floppy disk and one 5¼ inch 10 or 20 megabyte hard disk.

BASIC SYSTEM CONFIGURATION.
5 RS232C Serial input/output channels. Centronic parallel interface port. Keyboard interface. DMA network channel. Parallel input. Mouse interface. Diagnostic panel.

DISPLAY.
The 3004 is supplied standard with a Monochromatic high-resolution display with tilt and swivel characteristics (a colour display with high resolution of 800 x 600 pixels optionally available).
The graphic controls subset (VT-125 regis), enables tailoring of software in simple step tasks. Non English character sets can be programmed to suit user environment requirements. A direct bit by bit dump of the entire screen is available to LABTAM support Dot Matrix Graphics Printers.

NOT ONLY WILL YOU BE IN THE RUNNING TO WIN THIS SYSTEM — WORTH OVER $13,000 — BUT YOU ALSO RECEIVE AN EXTRA BONUS!!

All for only $35.40 for 12 months or save $5.90 and subscribe for 2 years.

Your free gift, when you subscribe to 'Your Computer' magazine, is the indispensable Swiss Army Knife! Always a reliable companion, this knife features wire stripper, can opener, cap lifter, key ring and a large and small blade, plus a screwdriver. Just about everything you need in an emergency.

CLAIM YOUR FREE GIFT TODAY

YOU MUST ACT NOW!

Simply complete the subscription card in this magazine and send it FREE to us. Within six weeks you will receive your Swiss Army Knife and be enjoying articles in the first of your home-delivered YOUR COMPUTER magazine.

YOUR NO-RISK GUARANTEE

If, for any reason, you are not completely delighted with YOUR COMPUTER . . . simply let us know, and we'll gladly refund the unused portion of your subscription.

magazine and **WIN!** This reliable and versatile Desktop Computer System could be yours!

The Labtam 3004 looks identical to this 3003 model, but has extra internal expansion capacity.

Subscribe for 2 years and **Save almost $6!**

DOUBLE YOUR CHANCES

If you subscribe for two years you will be entered twice in the grand prize draw. That means two chances to win the grand prize! Not only that, but you'll enjoy a generous discount of $5.90 off the total price of your subscription. THAT'S AN OFFER TOO GOOD TO REFUSE!!!

NSW Permit No TC86/531 issued under the Lotteries and Art Unions Act.
VIC Raffles and Bingo Permits Board No 86/271 issued on 13/03/86
ACT Permit No TP86/161 issued under Lotteries Ordinance 1964
(Offer valid until 30th November, 1986)

DON'T DELAY . . . MAIL YOUR SUBSCRIPTION CARD TODAY TO RECEIVE YOUR FREE GIFT!

If the Subscription Card is missing, simply phone The Federal Publishing Company (02) 663-9999.

What do you call software that gets smarter as you use it?

Q&A™ is built around an intelligent assistant that's smart enough to learn from your experience.

So you can teach it to respond to your needs to a degree no other software can match.

You'll find that that capability is worth a lot to you.

No matter what you use it for. Stock market analysis. Inventory. Employee data. Tickler files. Phone logs. Mailing lists. Anywhere you need fast access to stored data.

CALL IT EASY TO BUY.

At $499, we believe Q&A offers more value per dollar than any other software product on the market.

But we haven't stopped there.

We've come up with a way for you to get some value out of whatever database or word processing package you're currently using.

CALL IT THE BEST DEAL IN MEMORY.

We have an inexpensive way for you to take advantage of Q&A's intelligence and upgrade your hardware at the same time.

For a limited time, we're offering a half-length 256K memory board with Q&A. It's worth $400 on the street, comes with a 12 month warranty, and when you buy Q&A, it's yours for just $99

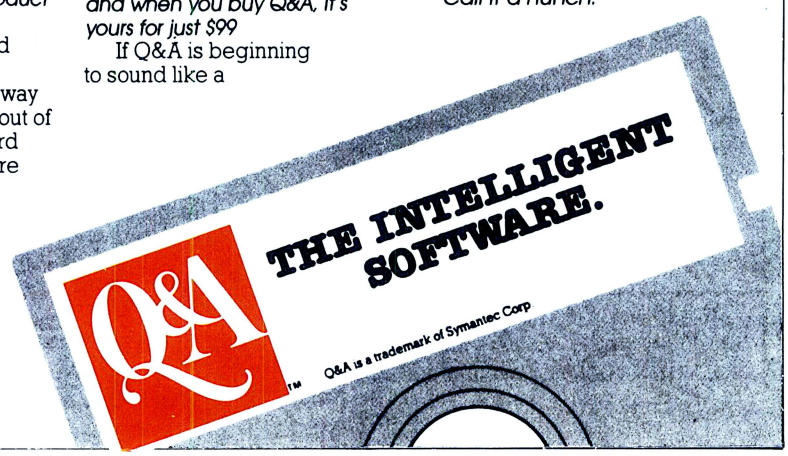
If Q&A is beginning to sound like a good investment to you, a quick demo should convince you.

Go to your local Q&A dealer and ask for one.

For more information on Q & A and What Is analysis call International Solutions Pty. Ltd., P.O. Box 269, Broadway 2007. Phone: (02) 319 1488 Telex: AA25331

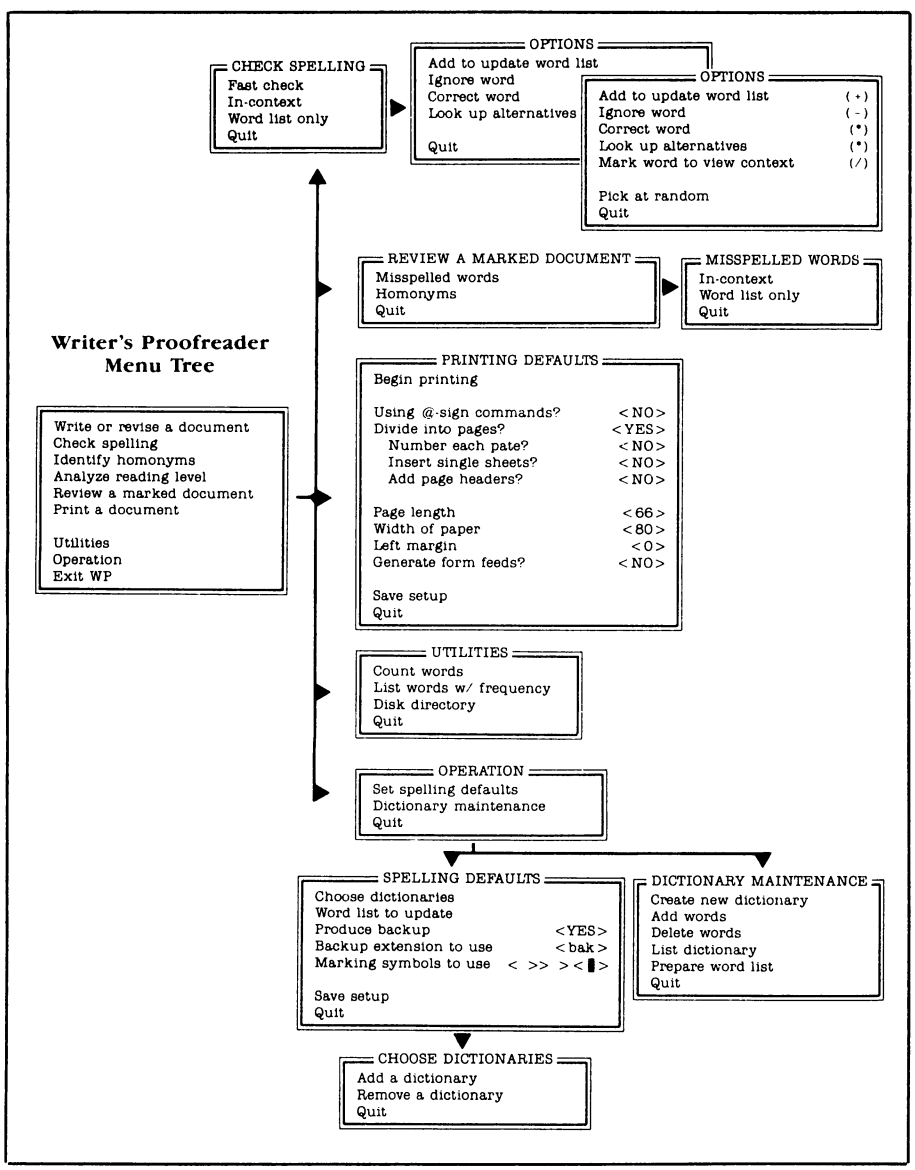
We think you'll be glad you did.

Call it a hunch.



THE PROOF IS IN THE COPY

"I'm a professional writer," said Ewart Stronach. "Proof it!" we replied and handed him this program from Thorn EMI Computer Software. Here's the error-free result.



DICTIONARY raiders, thesaurus plunderers, in fact, professional writers in general are the target market of Writer's Proofreader, a new program in the mould of the 'Perfect' suite (Perfect Write, Perfect Calc and Perfect File).

Writer's Proofreader is relevant to anyone typing material for publication, and offers most of the functions of professional proofreading. Many of its abilities are matched by contemporary dedicated word processing packages, but it is well worth considering as an alternative to upgrading to such a package. With Writer's Proofreader, you can stick with the word processor you've come to know and love, but still add some of the capabilities and refinements you might dearly like to have — at your fingertips.

There are nine modules or functions available within the program, each of which is accessible from the menu, without disturbing the textfile in use at the time. The functions are:

1. A 60,000-word dictionary which includes business and legal terms.

2. A dictionary custom update function with which you can add up to 100,000 more words to the dictionary. These could include such individual items as client lists or technical terms not normally found in a standard listing.

3. A spelling checker and corrector. The Writer's Proofreader finds, corrects and automatically replaces misspelt words. This checking, particularly of a long document, requires no operator intervention and can proceed unaided while you have that well-earned cup of whatever.

4. A homonym checker. Still confused by words that sound alike but are spelt differently? Their their, it happens two all of us occasionally. This program checks any suspect words in context and queries ▶

your application of them.

5. A thesaurus. This 50,000-word list provides you with words of the same or related meaning to the one you don't want to use. Why be plain 'unhappy' with your literary efforts when you can be 'desolate'?

6. The text editor allows you to load any ASCII file into Writer's Proofreader and apply the other modules to it. It will happily read files from a large range of commonly used word processing programs, provided they are stored in the ASCII format. Several word processors which do not automatically save in ASCII format can do so as an option, which is fairly simple to implement and thus renders your files readable by Writer's Proofreader.

7. A counting facility is available for counting words, sentences and characters. Handy for the "Give me 2000 words on the mating habits of the lesser Mongolian warty toad, and have it ready by Tuesday" syndrome.

8. You can check text for overuse of particular words with the word-usage count facility. This will also highlight the fact that you may have used the same word twice in a row. I have a habit of writing the same word at the beginning of a line as I used at the end of the previous line, and not picking the repetition up when proofreading.

9. The last module is a reading-level analysis, which checks your text and simply gives it a rating. Three pages of the documentation are given over to explaining how to operate this module and how the ratings are established. Two recognised rating structures are applied, the Automated Readability Index and the Coleman-Liau Formula. The result is displayed as a simple numerical quantity. Sadly, nowhere in the instructions is there so much as a clue as to what the score means; I guess we Professional Writers are meant to know all about such things. I asked a number of fellow professional writers about the tests and was finally able to gather from a librarian colleague that the number quoted corresponds to the number of years' schooling the reader would need to have to be comfortable with the text. (According to all this, you'd need around 13.5 years' education to find this article easy to read.)

Getting it Write

Using Writer's Proofreader is fairly simple. You load the program and place the disk with your textfile in drive 1. The opening menu gives you the choice of writing a document, checking spelling, identifying homonyms, analysing reading level, reviewing a marked document or printing a document. From a subdirectory you may call a utility mode which allows you to examine disk directories or move into the operation mode. In operation mode you can set print defaults, select your dictionary, maintain your dictionary and decide if you need back-up files of anything you alter.

A NEW SPECIES - THE COMPUTER ORPHAN

You may even know one! They are the people who saw an ad in the paper or on television for a supposedly compatible computer at a ridiculously low price. When they bought their cheap computer, they couldn't help but brag about their deal to their friends.

Eventually it happened - the cheap computer developed problems.

Unfortunately however, some companies do not even stay in business long enough to honour the guarantee (if any) they give with their computers.

Pantek Australia Pty. Ltd. have been supplying **LEGAL** and compatible computers to Australian industry and private individuals for almost three years now. With national service support provided by Hills Industries, the Pantek range of industry compatible XT and AT computers have become the only viable and more economical alternative to you know who.

Pantek - ***Here when you need us.***

AUSTRALIA PTY. LTD.

Melbourne	Sydney	Brisbane	Adelaide	Perth
(03) 836 9633	**(02) 387 1627**	Business Electronics P/L **(07) 369 6200**	Linx Computers P/L **(08) 42 8947**	Integrity Computer Marketing **(09) 381 2433**

Loading an existing and presumably unchecked file into Writer's Proofreader instantly allows your choice of operation. When you opt to check spelling, the screen clears and a count of the checked words appears in the top left corner. At the end of the check you are presented with a list of unrecognised words and asked if you wish to change or ignore them. If you choose to correct a word, Writer's Proofreader prompts for the correct spelling and inserts it in the text, in place of your mistake.

Words may be checked for spelling or an alternative word sought during input, without having to check the entire document. At any time during your typing you may place your cursor over the suspect word and call for a spelling check or list of alternative words. If you elect to wait until the end of your document, the words unrecognised by the dictionary will be automatically marked in your text and a marked copy of the file written to disk. The file may be called up again with the cursor placed over the first wrong word, with the option of checking its spelling or seeking an alternative word.

With Writer's Proofreader, you can stick with the word processor you've come to know and love, but still add extra capabilities.

Writer's Proofreader follows the same command structures and pull-down menu format as other programs in the Perfect suite. Pressing the escape key at any time while using the program produces a menu overlay on your screen, with a list of options and further help available if you need it.

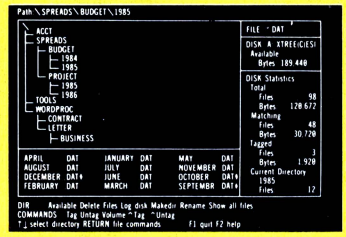
The program comes on two floppy disks, packed in a blister-style folder which also contains an easy-to-understand instruction manual. There's also a utility which allows you to select background and foreground colours on the screen, but this alteration of colours does not save to disk and must be repeated at each power-up.

Writer's Proofreader is highly functional, though you have to train yourself to make good use of it. As I mentioned before, there are word processors around which incorporate similar features, so first-time buyers should probably be looking at those. For professional writers already set in their word processing ways, Writer's Proofreader could be a valuable addition to their current package. □

Supplier: Perfect Information, PO Box 946, Crows Nest 2065; (02) 92 7777.
Price: $195

NEW SOFTWARE FROM USA

IF YOUR COMPUTER HAS A HARD DISK...



You need the new standard for File and Directory Management

XTREE simplifies file and directory handling by providing single keystroke commands to access, delete, rename, view, move, list, or show all files within any and all directories. XTREE displays a graphic picture of your directory organization, instantly shows all the files in each directory or all files across all directories. Easy to use, just point with the arrow keys (full scrolling and paging in all windows) and press a key. Menu clearly displayed at all times.

FEATURES

- ★ Shows **ALL** files or groups of files in **ALL** directories in one sorted display.
- ★ Copy, delete or rename multiple files in different directories in **ONE** operation.
- ★ ALL vital disk and directory statistics updated and on screen at all times.
- ★ Rename any sub-directory.
- ★ Multiple file rename with wild cards.
- ★ Change volume name without reformatting.
- ★ Full scrolling and paging in file and directory windows.
- ★ Quick and easy location of all directories and files.
- ★ Automatically copies groups of files across several diskettes.
- ★ Documentation written in clear, concise English.
- ★ **NOT** copy protected.
- ★ List files matching any file specification.
- ★ Sort files by name, size, extension or time and date.
- ★ Move files quickly from one directory to another.
- ★ Print out all files on entire disk — organised by subdirectory including name, size, date, etc.
- ★ View contents of all your files.
- ★ On line help screens.

REQUIREMENTS: IBM PC, XT, AT or compatible with 192K and MS-DOS 2.0 or PC DOS.

ONLY $99

Send coupon NOW!

XTREE is a trademark of Executive Systems, Inc.

To: **Perfect Information (Australia) Pty. Ltd.**
P.O. Box 946, Crows Nest NSW 2065
Phone (02) 957 6686 or (02) 92 7777 **YC**

Please send me _____ XTREE's at $99 each.

I enclose my cheque for $_____ or please debit my American Express, Diners Club, Visa, Mastercard or Bankcard.

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Card expires _____ Signature _____

Name _____

Address _____

_____ Postcode_____

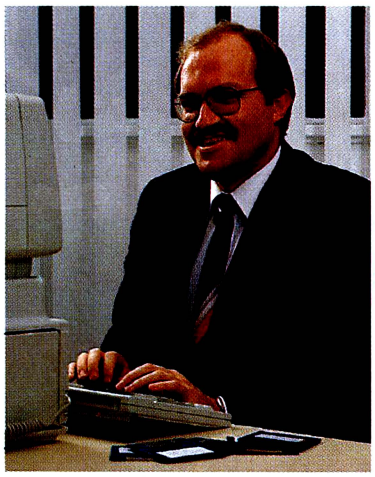
Phone No. _____

FLETCHER JONES
AUSTRALIA'S FINEST CLOTHING

Classic lines reflected through the warmth of rich Saxony Tweed, and the enduring style of flannel trousers. Jacket $220. Trousers $95.

Ogilvy/FLE0835

AMIC Corporate Membership – The businesslike way to stay ahead of the computer



"Our company was attracted to AMIC's Corporate Membership Plan because it provides supplier independent access to up-to-date equipment, and excellent training and advisory resources, at reasonable rates.

We couldn't justify maintaining this level of knowledge and equipment in-house, given the rapid pace of change in the hardware and software market place."

John Clark
Business Systems
Development Manager
David Syme & Co Ltd

A growing number of companies and organisations are enjoying the benefits of AMIC Corporate Membership.

It provides them with year-round access to the most comprehensive collection of microcomputer hardware and software ever assembled in Australia. And it provides a package of cost-saving benefits covering AMIC's complete range of facilities and services.

Ask for our free illustrated brochure containing full details of the AMIC Corporate Membership Plan by writing to: The Manager, AMIC, 449 Swanston Street, Melbourne, 3000 or 'phone (03) 663 6775.

AMIC AT RMIT
AUSTRALIAN MICROCOMPUTER INDUSTRY CLEARINGHOUSE

ARM 21468

XENIX SYSTEM V

The Unix for Business & Commerce

NOW AVAILABLE

XENIX 286: IBM AT & close compatibles, TI PRO, Olivetti M28, Compaq, NCR PC8, Mitsubishi 286, Corona ATP, Sperry PCIT.
XENIX 86: IBM XT & close compatibles, ITT, Olivetti M24, Sperry, Wyse, Compaq, Ericsson, Leading Edge, Mitsubishi, NCR PC86, Tandy 1200.
XENIX 68K: Macintosh XL.
XENIX 11: PDP-11/23, PDP-11/73, Pro 350, Pro 380. (Note: XENIX 11 is not System V).

WHY XENIX?

- Full commercial support and training.
- Wide and local area networking.
- Multi-user, Multi-tasking.
- User access controls.
- Enhancements: File and record locking; Shared Data, Automatic File System, check and recovery.
- Inter-process communications — signals, pipes, print spooler and semaphores.
- Xenix is an entire software family.
- Xenix lets users tailor their environments.
- Electronic mail.
- Small, fast kernel — Full Unix System V optimised for speed on micro-computers.
- Xenix has been installed on more microprocessor-based computers than all other UNIX based operating systems combined.
- Expanded and improved documentation.
- Xenix is full UNIX system V, only better.
- Xenix has superior multi-tasking design.
- Xenix is tuned for the micro-computer environment.

WHY BLUE SKY?

- We have been in business since 1978.
- We have been involved with computers since our inception.
- First Xenix sold in 1982.
- We know Xenix.
- Some of our customers include: NCR — Health Commission — Commonwealth Bank — Westpac — Telecom Australia — Philips — TAFE — WICAT — Dept. Science & Technology — University of New South Wales — Univesity of Sydney.

MEDIA TRANSFER

Blue Sky Industries designed and developed the extremely versatile system now marketed by NASHUA as the NASHUA DATA CONVERTER. • We provide a disk-to-(& from)-magnetic tape transfer bureau. • MAGTAPE — FLOPPY * UNIX — MSDOS — CP/M — CP/M-86 — PCDOS. 8" — 5.25" — 3.5"

SOFTWARE

	APPLE 2+	APPLE 2E & 2C	APPLE MACINTOSH	CP/M-80	CP/M-86	PCDOS	MSDOS	Xenix V 86	Xenix III 286	Xenix V 286
TYPEQUICK		•		•	•	•	•			
AZTEC 'C' personal compiler	•	•	•	•	•	•	•			
developer	•	•	•	•	•	•	•			
commercial	•	•	•	•	•	•	•			
AZTEC 'Z' editor						•				
T/MAKER III integrated office				•	•	•	•			
MULTIPLAN spreadsheet								•	•	•
INFORMIX relational database								•	•	•
FOX-BASE								•		•
LYRIX word processing								•	•	•
LEVEL 2 COBOL Ansi 74 standard								•	•	•
FORMS 2 Cobol Development Tool								•	•	•
ANIMATOR Cobol Symbolic debugger								•	•	•
C-ISAM								•	•	•
IBM MAINFRAME COMMUNICATIONS								•	•	•
MS-NET MSDOS/PCDOS Networking								•		•

HARDWARE

- Winchester disk controllers for S-100, IBM PC, stand-alone.
- 8 Port intelligent communications board for S-100, IBM PC, IBM AT.
- Statistical Multiplexers 8-16-24 ports with error correction.

BLUE SKY

BLUE SKY INDUSTRIES PTY. LTD.
2a Blakesley St., Chatswood, N.S.W. 2067.
P.O. Box 131, Lindfield NSW 2070. National: (02) 419-5579. International: +612 419 5579.
Telex: 74994.

FLASHPRINT

MODERN PRINTERS have dozens of commands. Until now it has been impossible to send all of these codes from a Wordstar file. Most printer demonstrations are written in computer code, not Wordstar.

FLASHPRINT!! changes the world of Wordstar and printers. Now you can print anything — even your own special characters or color on a printer with a multi-color ribbon. Ink jet printers are supported, too.

And here are special characters which we designed for an Epson and other printers
■ © ▒ → ← ● ✠ ▭ □ ||| ⬬ ● ▭ ▭
YOU can print compressed proportional elite pica expanded *italics* quality or any combination your printer allows. Single-key commands control SUPER and SUBSCRIPT as well as true underline. It's clever.

FLASHPRINT!! is supplied with commands for several popular printers. But you can chose the command and the coding your printer needs. **FLASHPRINT!!** does the rest. A single command can send hundreds of codes to any printer (Wordstar allows only four or five).

We even include notes on designing your own characters such as boats, cars and graphic symbols.

FLASHPRINT!! requires no special knowledge and Wordstar requires absolutely no installation. You simply copy **FLASHPRINT!!** and a printer table on to your normal Wordstar disk and run **FLASHPRINT!!** instead of Wordstar. It loads your table and runs Wordstar.

AND NOW WITH FLASHKEY!!

There's more. **FLASHPRINT!!** now includes **FLASHKEY!!** This allows any Wordstar character (including control characters) to be a function. That's 127 function keys on your computer. Functions can contain hundreds of bytes. **FLASHKEY!!** also allows key translation. You can create a Dvorak keyboard or change Wordstar's clumsy commands.

Don't take just our word for it. Here are some genuine unsolicited comments from **FLASHPRINT!!** users:

● Gee-whizz, effective, shazzam, whoopeedoo... Streets ahead of any competition. *Australian Electronics Monthly (October 1985).* ● Top marks... A big bouquet to James Tucker for his documentation. *Your Computer (September 1985).* ● If you need any kind of enhancement to Wordstar this is the one. The ads don't do it justice. *First Osborne Group, USA (Foghorn, July 1985).* ● Excellent value for such a useful piece of software. *John P. Carney.* ● **FLASHPRINT!!** is everything you said it would be. *Terry Bibo.* ● I had been going to buy Smartkey, but **FLASHKEY!!** will do all the changes I want. *Peter Carnell.*

● It represents the best value for money of any software I have purchased. *Gordon Woolf.* ● Every Wordstar user should have this one. *Kaypro User Group of Victoria.*

$58 **CP/M-80 version** includes disks for more than 100 different formats, including Microbee DS, Microbee 3.5-inch, Osborne, Kaypro, Televideo and 8-inch IBM standard. Please specify your format when ordering and include $4 for packing and air mail delivery. Guaranteed to run with Wordstar versions 2.26, 3.0 and 3.3.

$88 **MS-DOS version** (360K 5.25-inch disk for Wordstar V3.3) with IBM function keys. Please include $4 for packing and air mail delivery.

JRT SOFTWARE
42 TURNERS AVENUE
COROMANDEL VALLEY
SOUTH AUSTRALIA 5051 (08) 278-7076

We believe FLASHPRINT!! with FLASHKEY!! will completely change the way you use Wordstar.

Software

Better BASIC
Software Shop, (02) 451 1256
Price: $375
A new programming system for IBM PCs and compatibles, this package adds modular and structured design to Microsoft BASIC. Features include high-speed execution, support of up to 640 Kbytes of RAM, variable-precision decimal maths, optional 8087 maths co-processor support, program block structures, record and pointer data types, procedures and functions, local and global variables, recursion, separately compiled library modules, language extensibility, support for overlapping windows, simple support for assembly language calls, and an optional runtime system. Claimed to be as easy to learn as BASIC and easier to use, the program's modular design lets users create powerful extensions to the core language. OEMs can create custom modules of self-contained, separately compiled software packages. A sample diskette is available for $10.

Microsoft Access
Microsoft (02) 27 3571
Price: $510
Access is a new business tool for IBM PCs and strict compatibles, designed to 'open doors' to a range of information systems and on-line databases. Features include single-modem hook-up to a maximum of 15 host connections using X-PC protocol, a unique menu system for each access to information and electronic mail, built-in language, ability to customise communication requirements, error-correcting protocol and PC-to-mainframe communication. Requires 256 Kbytes, DOS 2.5 or higher, two disks and an asynchronous card.

Mview
Metrotel, (02) 212 6866
Price: $250
Metrotel believes information users want information, not incomprehensible technology. This communication software is designed for people with no technical knowledge, to allow them easy access to Viatel-type sources of information, with simple instructions on screen for viewing and saving the data. Mview has an off-line database, so information gathered may be processed easily. Designed to run under MS-DOS on IBM or compatible machines.

Prolog for Acorn/BBC
Barson Computers, (03) 419 3033
Price: Around $170
Released on a 16 Kbyte ROM chip, this artificial intelligence language is available for the first time for Acorn and BBC computers. Prolog is the language being used by the Japanese for their fifth-generation computer project, and is also used in many schools to teach a logical and descriptive approach to programming. The program comes with a 'friendly' front-end interface to make the language's syntax easier for a novice user.

Spice IC Design Package
Minicomp, (02) 957 6800
Price: $1735 (excl. tax)
Spice is a general-purpose circuit design simulation package produced by Cromemco to run on its Cromix-D or Cromix-Plus operating systems (Unix). The program simulates actual circuit applications, which can be composed of active or passive elements. The package is particularly useful where prototypes are not possible, such as in integrated circuit design, or where breadboarding is not feasible. Configured for machines with 1 or 3 Mbytes of RAM, Spice comes with sample input and output files.

VP-Planner
Pantek Australia, (03) 836 9633
Price: $150
VP-Planner is designed to work like Lotus and is said to have all the same features, plus the ability to create, read, write, update and join dBase II and III files directly from a worksheet. With an auto-key command that lets users learn keystroke sequences and store them as macros, zero column width that allows concealed macros and the ability to print one worksheet while working on another, this package appears to offer great value.

Wordcraft Ver 2.5
Personal Computer Software,
(02) 923 2899
Price: $750; update from Ver 2.47, $195.
This is an update of a well-known word processing system, which moves closer to the power of a dedicated word processing machine. Wordcraft 2.5 has the ability to read and write IBM DCA format files, can fully schedule background printing, has multi-document text retrieval and offers the capability of accessing virtually any other program or software package without having to exit. It can also drive a laser printer and queue documents, and has a function called Alien which allows the reading of files from other word processors.

New Machines

Barson XEN
Barson Computers, (03) 429 2977
Price: $8210 (excl. tax)
This is a totally new IBM AT-style system designed to run up to 60 per cent faster than the AT itself. Capable of running the Xenix multi-user operating system with up to 16 terminals, and aimed at users with volume data processing requirements, its standard features include 1 Mbyte RAM ▶

(expandable to 5 Mbytes), six expansion slots, keyboard compatibility with the PC/AT and Apricot Xi, RS232 and Centronics interface ports, optional mouse/trackerball and MS-DOS 3.1 with Microsoft Windows. It also offers a fully integrated communication system.

Commodore C128D
Commodore Business Machines,
(02) 331 2061
Price: $1099
An upgrade of the C128 home computer, the 128D features a built-in disk drive and clip-on keyboard. With three operating modes, C64, C128 and CP/M, it weighs 8 kg and is the size of a large briefcase. It has 128 Kbytes of RAM, expandable to 512 Kbytes, and can be connected to a monitor or standard television set with 40- or 80-column full-colour display. The C128D works out to be $199 cheaper than buying the C128 and adding disk drives, and it has the advantage of portability.

Kaypro PC
Kaypro Corp, (02) 542 3866
Price: $2195
A *white* Kaypro! A new PC and XT compatible with several improvements. Supplied with a multi-function board which contains the disk control, 256 Kbytes of RAM, and a serial and parallel port, the new Kaypro also comes with a standard 30 cm monochrome monitor (green) and two 360 Kbyte drives. The 130 watt power supply is sufficient to support a hard drive, which you might like to add later. As usual, the Kaypro comes with bundled software.

Services

Installation Support Programme
Comprador Business Systems,
(02) 681 400
Price: Free with Autocad purchase, or $6000 on its own.
A service designed to maximise benefits from the Autocad system in the shortest possible time, the programme includes pre-installation set-up and test, installation, on-site training and operations guide development. A full 12 months of telephone support follows the set-up. Also included is a copy of the new teaching guide *Inside Autocad.*

Peripherals and Extensions

20 Mbyte tape cartridge for Rainbow
Digital Centre, (02) 419 7588,
(03) 266 1688
Price: $2590 (excl. tax)
The first of its kind available for Rainbow users and based on a Cipher model 525 floppy tape drive, this unit can transfer a full 10 Mbytes of information from a Winchester in 18 minutes. It is supplied with two utility programs, CP/M 86/80 and MS-DOS. The machine is menu-driven for simple selection of format, back-up and restore functions, and plugs into the computer's unused RX50 controller. This may be the pot of gold at the end of your Rainbow.

Colour copier from display screen
TCG Group, (02) 699 8300
Price: Not available.
Designed specifically for CAD/CAM/CAE, process control, mapping and presentation graphics, this new series of colour copiers will produce a copy of your display screen in less than 60 seconds. It's available in two sizes, A3 and A4, and uses a combination of colour and thermal techniques. High-precision paper handling gives accurate image registration, and up to 4912 colours are available at eight dots/mm on the A3 and six dots/mm on the A4 size, plus a reverse-background function.

Dreamer numeric/function keypad
Valrian Enterprises, (094) 69 5341
Price: Around $595
A new keypad to suit Apple II+, IIe and IBM PC/XT machines, this unit has a number pad with cursor control and page up/down keys, plus 30 other keys which become single-entry command keys for programs such as Lotus, Wordstar and Visicalc. This makes a range of more than 100 commonly used functions accessible with single keystrokes and saves using the IBM's 'Num Lock'. The keyboard should cut down on training time and the memorising of control-key sequences. No additional power supply is required to run the Dreamer.

Facit Opus 2 Laser Printer
Ectron-EAI, (02) 427 3322
Price: Not available
A new laser printer designed to bring down the cost per page of letter-quality printing, the Opus 2 has a quoted lifetime of 600,000 pages and is capable of using 16 fonts on the same page. Four basic fonts are included with the standard package and these can be modified to give bold type, shadowed type and so on. More fonts can be loaded from the host computer, or from cartridges inserted in the printer. Parallel and serial interfaces are provided as standard, along with the Diablo 630 command set.

Mac Bytebuffer
Byte Electronic Controls,
(045) 77 6023
Price: 64 Kbyte $325; 320 Kbyte $539; 512 Kbyte $599.
Ian King, previously of Apple's repair centre, designed the Bytebuffer to give Macs back to their users. The 64 Kbyte buffer sits between the Mac and the printer and holds about 10 pages of output while supervising the printer; the 320 Kbyte model holds about 50 pages. The Bytebuffer plugs into the printer port, and draws its power from the computer. It is compatible with a large range of printers and is very useful for those with slower letter-quality printers.

Micro to Honeywell Link
SNS *Group,* (02) 958 2399
Price: Around $1400
The package consists of a board, menu-driven set-up software, a keyboard overlay and full documentation. The Honeylink provides full emulation of Honeywell VIP 7801, 7804, 7814S and 7814A terminals operating synchronously or asynchronously. Using separate communications drivers, the board can provide up to four terminal addresses at once. A printer buffer is included and the package also supports programmable function keys and colour or monochrome screens.

MM 1812 (Napoleon) Digitiser
Minicomp, (02) 957 6800
Price: $2274
A new addition to the Summagraphics range of digitisers, this machine is called the 1812 (Napoleon, get it?) because of its 18" by 12" (45 by 30 cm) size. It offers an array of input devices, such as a four-button cursor, a unique three-button cursor, a stylus or fingertip control. The unit is fully compatible with the Autocad design package and has a resolution of up to 1016 points per square inch. The low power requirement of less than three watts allows the unit to operate off existing power supplies.

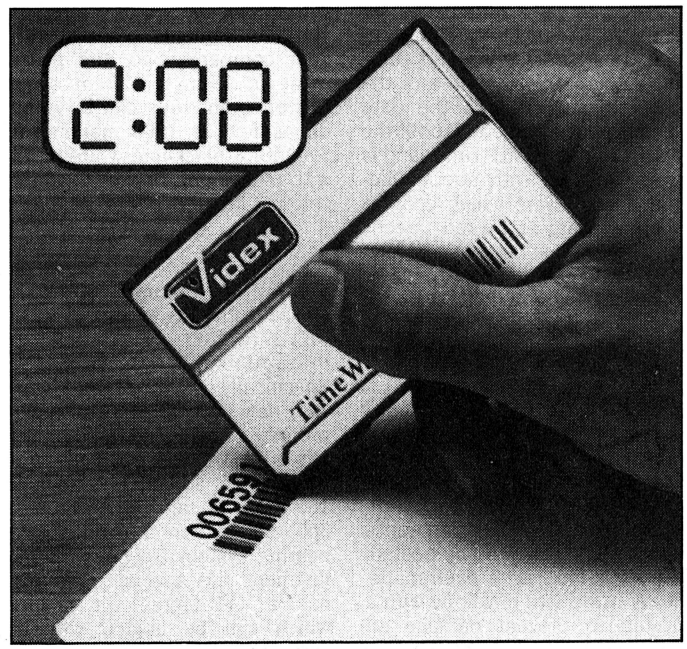
Modem Accelerator
Shuttle Datacomm, (03) 267 1011
Price: $795
Described as a 'word cruncher' this plug-in board for PC/XT/AT-style computers can be used in conjunction with almost any modem and software capable of sending binary files. Also on board is a 28 Kbyte dictionary. The Accelerator stores ASCII data to disk in about one-third the usually required space. Sending a file compressed by the Accelerator takes about a third the normal time and adds the security of encrypted data. For telecommunications a device is required at both ends.

Speed Demon
Software Corporation of Australia
(03) 699 7255
Price: $1152 (IBM);
$510 (Apple II)
Another speed-up board, but this time for the Apple II or IBM PC, XT or compatible machines. Speed Demon lives up to its name, speeding processing by a factor of up to 300 per cent without the need to replace RAMs with higher-speed chips. Driven by its own 10 MHz 8086 processor and capable of supporting another 8087 maths co-processor, the Speed Demon can access normal I/O devices. An additional feature is the on-board 8 Kbytes of cache memory.

Teac MT 2ST half-height back-up tape
Electrical Equipment, (02) 267 1122
Price: From $1240
Teac, a world leader in tape-drive technology, has released a half-height series designed to provide storage and back-up in the space designed for a single drive. The MT 2ST has a capacity of 20 Mbytes and a data transfer rate of 86.3 Kbytes per second, at 90 ips streaming speed. The unit comes with full SCSI input/output compatibility for direct operation with Winchester drives.

Thunderer modem
Acetronics, (02) 645 1241
Price: $250 with phone
A Viatel-compatible modem with 1200/75 baud, 1200 half duplex, 300 answer and originate and switched Bell system all at the flick of a switch. The modem measures 15 cm by 8 cm by 5 cm, and comes complete with a power pack, lead and plug. Fully assembled and tested with a two-year guarantee, the Thunderer is designed for simple connection to any RS232 port.

Timewand barcode reader
Ikon Distribution, (02) 612 9875
Price: From $350
This is a self-contained barcode reader which can store up to 16 Kbytes of data — the equivalent of 1750 scans or one scan taken every 16 seconds over an eight-hour day. Once the data has been collected, the Timewand may be plugged into a recharging station, which is in turn plugged into an RS232 port, and the information downloaded. Data may be stored for up to four days and the Timewand can be programmed in BASIC, Pascal or C. Applications could include all traditional barcode uses, and numerous other functions such ▶

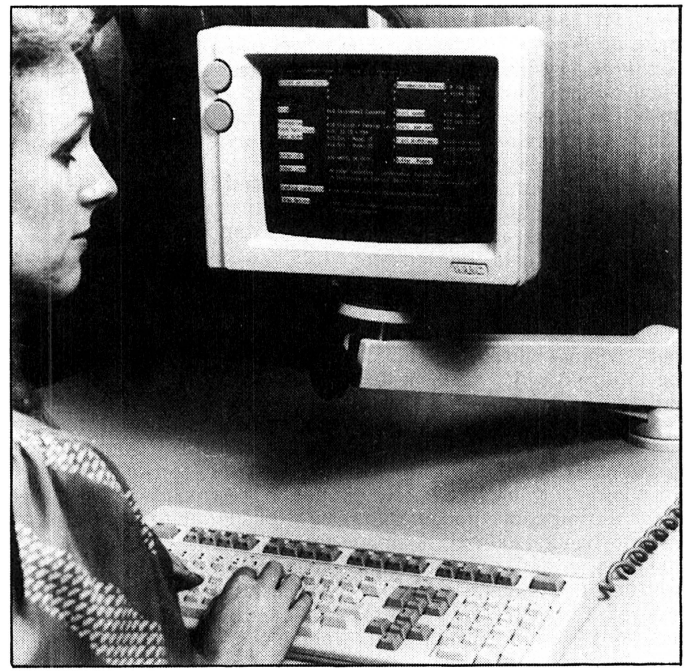


as security calls, time-based security calls and sequential inspection needs. Timewand automatically stores the time of the operation as well as the data read from the barcode. About the size of a credit card, Timewand is also available with special file-transfer software which enables scanned data to be fed directly into an existing database. Macintosh users can develop their own barcodes using a font available from Ikon.

Miscellaneous

Disk-Pak
Disk-Pak Australia, (08) 277 8020
Price: $19 for 50; $350 for 1000
At last a disk mailer that looks like it might stand being posted, the Disk-Pak is a well-made, heavy cardboard envelope with a rip-tab to prevent damage on opening. Available in plain white with address label, or printed to your requirements in colour with your company logo, the packs come in 13 cm or 20 cm sizes. Custom print runs can be done on as few as 1000 mailers, at $500 for a black-and-white motif with plain print, or only $540 for colour with your logo.

Wang PM004 monitor arm.
Computer Products Network,
(02) 2910 3100
Price: Around $240
Specifically designed for use with the new Wang PM004 series monitors, and called the Monitor Mover MOM-002, this new arm has a height adjustment range of 180 mm and can swivel through 360 degrees on a needle race bearing system. To get fine adjustment the special mounting has a 115-degree tilt facility which can be angled without awkward unlocking and locking.



ACCESS FOUR!

Much more than a Spreadsheet:

ACCESS FOUR is the first release of a new suite of software which expands to the completely updated OPEN ACCESS to include Database, Communication and Wordprocessing, user language and networking as separate modules or in standalone form.

MORE THAN A SPREADSHEET, ACCESS FOUR OFFERS YOU:

- **an advanced full-function Spreadsheet, *plus:***
- **Spreadsheet Database capability**
- **top-quality Graphic output**
- **an Electronic Desk**
- **a Text Editor**

ACCESS FOUR is NOT memory-based, but relies instead on virtual disk memory for storage of information. In taking advantage of all available memory and disk space, ACCESS FOUR provides speed and large spreadsheet capability.

ACCESS FOUR requires 256K of RAM and twin floppy disk drives for its basic operational requirements, but is capable of using all your PC's available memory should it be available.

THE ACCESS FOUR SPREADSHEET
This spreadsheet is BIG — 3,000 rows by 216 columns — and it's all usable, provided you have disk space.

SPREADSHEET WINDOWING.
Up to six windows displayed on screen at once.

ACCESS FOUR GIVES YOU MACROS!
ACCESS FOUR delivers Macros at two levels.

The model called "TARGET", designed as a game!

TARGET features screen messages displaying user prompts, pop-up windows for data entry and excellent utilisation of the screen's colour graphics.

All this in a spreadsheet!

Lotus users who tire of looking for a circular reference in a spreadsheet model, or having access to a range name list, will be pleased to know that ACCESS FOUR caters for both of these eventualities automatically — with pop-up windows.
Utilities are also provided for reading-in Lotus WKS and DIF files.

GRAPHICS PLUS.
ACCESS FOUR offers graphic depiction of that spreadsheet data, even if your PC doesn't have a colour monitor or a graphics card!

THE DESK ON YOUR SPREADSHEET.
You gain instant access to your business-oriented desk at the touch of a button.

The desk functions live ON disk, and are used WHEN and WHERE you need them — even if you're deep in the middle of a spreadsheet calculation!

They're selected through the menu, which also displays a 3-zone time clock and calendar. Menu options include Calculator (with Scientific and Statistical functions, 12-digit precision, 10-memory registers), Alarm, Text Editor Note Pad, Diary, Stopwatch, Date and Time-setting options, Business Card File and Value Conversion Table.

You're invited to enjoy ACCESS FOUR!

If spreadsheets form a large part of your day-to-day business activity, then ACCESS FOUR is definitely the new release business programme for you!

FOR THE WINNING BUSINESS COMBINATION, TEAM UP WITH ACCESS FOUR!

To: SOFTWARE SUPPLIERS PTY. LTD., 7 Avon Road, North Ryde, NSW 2113.

☐ Please send me more info on ACCESS FOUR and your Support and Training team.
☐ Please tell me the name, address and phone number of my local ACCESS FOUR dealer.

Yes, I wish to discover the power of ACCESS FOUR for my company.
☐ Please send my ACCESS FOUR demonstration disk — completely obligation-free — by return mail.

SPI™ SOFTWARE PRODUCTS INTERNATIONAL
Trademark of Software Products International

My PC/MS-DOS computer is:_____
Model:_____
NAME:_____
COMPANY:_____
POSITION:_____
ADDRESS:_____
P/CODE:_____
TELEPHONE: Bus:_____ Private:_____

SOFTWARE SUPPLIERS

SOFTWARE SUPPLIERS PTY. LTD., 7 Avon Road, North Ryde, NSW 2113.
Call us in Sydney on (02) 888 1955; TELEX AA10717491; OTC MINERVA: SOQ001
or contact our Sales Office in your State:
Melbourne: (03) 598 4522; Brisbane: (07) 345 2411; Adelaide: (08) 2 726022
Perth: (09) 386 7918/19; Canberra: (062) 49 7915.

We observe strictly the terms and conditions of our software licensing agreement, and always stand by our product warranty. So always look for the "Software Suppliers" name on the software BEFORE you decide!

BY COLIN TRINGHAM

WITH THE HYPE of the recent computer show in Sydney behind us, we should have had time to think seriously about just what we use our computers for. If you're mainly into games you must have been impressed by the marvellous graphics on some of the competitive machines, but for word processing and other home tasks, the Microbee, especially with its bundled software approach, has been proved yet again to be a total bargain package.

It will be interesting to see how much — and how quickly — new software becomes available for the new Microbee Premium range — and just how much existing software will be converted to use the features of the Premium.

The colours on the Premium are so different from previous Microbees that many colour programs in both BASIC and machine code give results you don't want! The system of 'latching' the various banks of PCG characters causes some incompatibility in machine code programs too, as I found out the hard way recently. However, as they say in the gym, there's no gain without pain, and hopefully the new colour system will now be stable, as the better range of foreground and background colours is certainly a good thing.

Microbee Systems' policy of upgrading machines is one of the best ideas around in the microcomputer industry, as few of us know exactly what we need when we start out. The basic Microbee lets us in on the ground floor without too much expense, and allows us to proceed to the headier heights of disk storage and colour without losing our initial investment.

I found this most useful, and it gave me the chance to learn BASIC on my old tape machine before I had to learn all those new CP/M commands when I upgraded to disk. However, there's one small annoyance for many users who have converted to disks: what do you do with all your machine code tapes which are copy-protected and cannot be transferred to disk?

I was most interested to read in *The Sting*, the WA User Group's newsletter, a review of a program which is offered by John Arnold of 36 Victoria St, Rooty Hill 2766, for only $9.50. This program is supplied on tape and can therefore be used by both 13 cm and 9 cm disk users, and will transfer the majority of copy-protected machine language programs to disk; typically around 95 per cent of tapes can be transferred using this reasonably priced program. I don't condone piracy of programs in any form, but for this purpose — to transfer your legitimately bought programs — the tape is a winner.

Upgrading

While on the subject of upgrades, I understand those of us who have the 64 Kbyte (really 56 Kbyte), 13 cm disk APC system will be able to upgrade to a Premium version, even though there is no real equivalent in the latest range. The only 13 cm disk machine now sold by Microbee Systems is the 128 Kbyte small-business computer.

Another small problem which has plagued many readers has been the editing of their old Wordbee files when they have upgraded to Wordstar. The problem is Wordbee uses just a linefeed code at the end of each paragraph, while Wordstar uses a linefeed *and* a carriage return. This means Wordstar 'sees' the Wordbee file as just one long line, so using the Line Delete command is fatal as the entire copy will be lost!

Reformatting the copy results in the paragraph endings being seen on the screen as such, but Wordstar is still not happy with the absence of the return code. My solution is simply to go to the end of each paragraph and put a return there manually. Of course, it should be possible to get Wordstar to automatically find all instances of the linefeed code and replace them with the linefeed/return combination, but I could not manage this. If you find a solution, please let me know. When I initially received Wordstar I used a special program to perform this function for me, but I understand it doesn't work on the CIAB system.

New Programs

Timbersoftware of PO Box 350, Wauchope 2446, has written to me with details of two new programs for Microbee users. The first is a comprehensive accountancy package aimed at the small-business or tradesperson who wants a simple accountancy package. The program is in full colour and features graphics and, in the latest version, a mini word processor. On a single-drive system the program can handle 2500 transactions over 12 months, while a dual-drive system will handle 200 accounts. The cost is $149, and I hope to provide a full review of the program shortly when I can find someone with a background in accountancy or small business to evaluate all its features.

The second program announced by the same supplier is Roots/M, a program for keeping family records and genealogies. It comes with excellent documentation and costs $89.

Among the other Microbee correspondence I received this month was an interesting interchange of letters with Mr Gardoz, who already has several programs on sale through Honeysoft. His latest program, Bee Calculator, turns your Microbee into a comprehensive scientific calculator with several special sections, in addition to the usual mathematical functions.

A Pythagoras function enables you to compute the third side of a triangle given the other two, and it can perform sum, median and standard deviation functions, solutions to linear simultaneous equations (with two unknowns), addition and subtraction of vulgar fractions, and number sorting and statistics. The program will even solve quadratic equations.

Mr Gardoz has decided to sell this program himself for $14 after unsuccessfully submitting it to several educational software groups. One group had the program for evaluation for three-and-a-half months and still hadn't even run it at the end of that time. No wonder there are comparatively few new educational programs available! If you want a copy of Bee Calculator, send your $14 to Honeypot Software, 1 Yarana Drive, Mt Helen 3350.

Manuals and Bulletin Boards

For those interested in the technicalities of the Microbee, the *Microbee Hardware Notebook* is a very useful (if rather expensive) manual. There have been two sets of updates to date, and if you need these you have to add another $10 to the price of the original manual. However, keeping the manual up-to-date makes it easy to decide what sections of the Microbee are to be serviced if the system crashes.

Modem owners will be pleased to hear the Sydney Microbee Users' Group has completed the upgrading of its bulletin board, and the system should be crash-proof from now on. It is intended for SMUG members, but visitor access is available. The number to ring is (02) 607 7584; the sysop is Bob Fryer, who is also editor of the group's excellent newsletter. Contributions for the newsletter can be passed on via the bulletin board (please!).

COMMODORE HEAVEN

No games but everything else stocked at discount prices. We directly import hundreds of items and also deal with all the usual warehouses. Let us show you how your Commodore can become a powerful business machine.

We stock hundreds of lines most dealers have never heard of, including 15 or so word processors, 20 or more spreadsheets and databases and about the same number of accounting systems but can only list some here. Visit our new 2,000 square feet showrooms in Sydney or Melbourne to see the full range.

BUSINESS & ACCOUNTING

TOTL BUSINESS: Lightning fast machine language version (new in July 1984) includes stock control and printing of invoices and aged statements. Dates, postcodes, etc selectable for Australia or US. All programs now load from a master menu. Balance-forward system. Invoices allow both taxable and non-taxable items and screen prompts and printed output headings can be customized to fit any business. This and an MSD or Commander disk drive make your 64 one of the most powerful business machines available RUN magazine rates it a Best Buy and the US Commodore Users Group has added this enhanced version to their Approved list. People have brought the 64 just to use this program.
CASHBOX 64
CASH REGISTER PROGRAM
HOME MANAGER
TIME & MONEY MANAGER
PERSONAL PORTFOLIO MANAGER
CHARTIST STOCKS & SHARES
PERSONAL ACCOUNTANT
64 ACCOUNTING: Will do all the books of a business, produces trial balance profit and loss and balance sheet and prints reports, invoices and statements. By using Profit Centres for different accounts, you can obtain seperate financial reports for each department and also combine these into a single report. Up to 10 chequebooks may be used concurrently and each transaction can be split across 20 categories. It does not have Accounts Receivable nor Accounts Payable open files and therefore cannot age statement balances but if the receipt field is left blank, the balance can be considered outstanding. Will print detailed or summary Trial Balances and other financial statements at any time for any period. Excellent review in COMPUTE!'s Gazette (November 1984, page 113).
GENERAL LEDGER
MAIL LIST & LABELS
DATABASE
WORD PROCESSING
SPELL CHECKER
INTERGRATED WORD & DATA MANAGEMENT
KEYWORD CROSS REFERENCE
TIME MANAGEMENT
CODEWRITER Ready-To-Run SERIES: Small business inventory, retail invoices, salesmen's expenses, accounts payable, accounts receivable, library, appointment planner, bill busters, coin collector, school reports.
DIALOG BUSINESS SOFTWARE: Stock aid, transact, invostat, home accounts.
ELECTRONIC HOME SERIES: Budget, diary, letter writer, expense manager, bill payer, bank manager.
64 ACCOUNTING
HOME PAK: 3 programs in 1, Word Processor, Terminal, Filing Programs.
ACCOUNTS RECEIVABLE
GENERAL LEDGER
ACCOUNTS PAYABLE
INVENTORY MANAGER

SPREADSHEETS/DATABASE

KWIK-CALC
POWERPLAN SPREADSHEET
MAGPIE 64
SWIFTCALC w/- SIDEWAYS
MULTIPLAN
COMMODORE'S CALC RESULT
CALC RESULT ADVANCED
PRACTICALC
INSTANT RECALL
COMMODORE DIARY
BUSICALC 3
BUSICALC 2
BUSICALC 1
SUPERBASE 64/PLUS 4
SUPERBASE STEPPING STONES: Purchases, day book, stock records, estate agent, travel agent, solicitor time record, accountant time record, club membership.
SUPERBASE 64 V2.0

INTERFACES

C64 IEEE FLASH!
C128 QUICKSILVER FLASH
DAMS IEEE INTERFACE
PET ● IEEE CABLE
FLASH with ON/OFF switch
FLASH SX64 version
FLASH! for 128

HARDWARE

MOUSE FOR 64/128: Complete with graphics software. Printer options.
LIGHT PEN with Cad-pak software
SKYLES 3 SLOT CARTRIDGE EXPANDER
4-WAY USER PORT EXPANDER
VOICE MASTER Covox: Speech synthesiser that uses your own voice. Your 64 can sing, grunt, make animal noises or talk in any language you like. Included are programs for talking calculator and talking alarm clock.
SUPER VOICE MASTER: Now your 64 or 128 will do what you tell it! All of the above PLUS Word Recognition (your 64 responds to your spoken commands) and Voice Harp.
CURRAH SPEECH 64, two tones
FLASH! w/-switchboard
FLASH! 64 model
1541 COOLING FAN
NUMERIC KEYPAD 64/VIC-20
OLYMPIA PRINTER: New low price 160 cps, NLQ, H. tops.
RITEMAN SUPER C PRINTERS: 105 cps dot matrix. Prints without bending the paper so even thick card can be used. Full graphics, Commodore interface included. Complete with stand to allow paper to be stacked.
Printer INTERFACES: 12 different
18K PRINTER/BUFFER for Centronics: Uses the hidden memory of your C64 or C128. Includes program to interface from the User Port.
PRINTMASTER/W & G graphics i/face
RS232 DE LUXE INTERFACE
C64 MOTHERBOARD (w/reset, 3-way)
2-IN-ONE MONITOR CABLE for 128
DATASETTE WITH DUPLICATOR: Faithfully reproduces an archive copy of any Tape Program.
PAGEMATE Text holder
DISKETTE SAFE, lockable 100 capacity
COMPUTER MAINTENANCE KIT
FERNSPRECHER Auto Modem: Auto-answer, Viatel, CCITT and Bell. Complete with software for C64 (RS232 i/face needed for other computers). Telecom Approved. This and the 1.1 meg drive is the basis for a BBS.
FERNSPRECHER 35 Modem
TAIHAHO MODEM: Auto dial & Answer 300 Baud. Free VIP Term Program.
TELEDATA (Handic)
TEMPERATURE PROBE: 0-100C with Software. Great for experiments.
LIGHT SENSITIVE PROBE: Turn your lights on automatically with your computer.
COMPUTER SWITCH: Control mains operated equipment. 240V 10A. Capacity approved. 8-CHANNEL 8-BIT: A to D converter. Up to 4000 conversions per sec.
VIC-REL: Computer controlled relays. 6 output and 2 input circuits. Great for a burgular alarm.
COMPUCOVER Plastic, hinged
MAINTENANCE KIT: Screen cleaner and cloth. Head cleaner and instructions.
HEAD ALIGNMENT KIT: Fix your own Datasette. All tools supplied.
64K MEMORY EXPANSION: Gives 65536 extra bytes segmented memory in the 6K from $8000 to $9FFF. Complete with instructions on how to load eight different 8K programs into the computer's memory at once. Really shines when running assemble language. Ramdisk program (included) turns it into a solid-state disk drive, loading 24K in ONE SECOND! On VIC-20. It includes three 8K blocks for 1, 2 and 3 plus another 40K that can be paged in and out of Block 3.

DISK DRIVES

MSD DUAL DISK DRIVE: 240 Volt, US made. All metal, with one parallel and two serial ports and 6511Q microprocessor with 16K ROM and 6K RAM. Serial interface cable included, but also has parallel port. VIC-20, 64 and 128 read/write compatible and also read compatible with the big Commodore business machines. Formates disks in seconds and duplicates in a minute or so.
COMMODORE 1 MEG DRIVE
TAIHAHO Commodore/Apple DRIVES: Top quality all-metal drives that will run BOTH Apple and Commodore disks. Complete with all plugs and 20-line parallel cabler to connect to all plugs to your C64 or C128. Switches to let you choose Device No. 8 or 9 and Normal, Write Protect or Override Write Protect. Single drive expandable to double with additional drive. Regulated 240 volt 50Hz power supply.

EDUCATIONAL

STARTER KIT for programming ..... Disk $25
10 Great programs, including word processor, mailing list, basic programming primer, 6502 intro, sound and sprites.
TRAINING KIT Disk/Worksheet $29
How to get the most from your keyboard, how to use your disk drive effectively, how to write your first BASIC program.
32 PROGRAMS ..... Disk & Book $25
The book alone retails for $29.95! 32 useful programs already on disk to save you the chore of punching them in. Book also gives you exercises in how to change them. A vital follow on to the above or to Commodore's introduction to Basic.
ALL THREE OF THE ABOVE $69
INTRODUCTION TO BASIC ..... ea $29
Commodore's famous course that assumes no prior knowledge and takes you step by step through programming. Each Part contains 2 cassettes of programs and a comprehensive manual.
MATHS, O LEVEL ..... T$19
PHYSICS, O LEVEL ..... T$19
GERMAN MASTER, A, O LEVELS ..... T$19
FRENCH MISTRESS, A, O LEVELS ..... T$19
COMPUTER STUDIES ..... T$19
COMMODORE'S INTRO TO BASIC $29
HAN-ZON SERIES
Beat the Bomb, Keyboard Skills, Super Drag D ea $19
Spelling Treasure ..... D ea $25
Tell Tales ..... D$39
STARTER KIT for programmers ..... Disk $25
DR WATSON ASSEMB. LANGUAGE TUTOR T$45
IDN TYPING TUTOR $25
IDN EDUCATION II ..... D$75
IVAN BERG EDUCATIONAL $29
Tapes and Students' Notes, Commodore's newest. Titles come and go quickly, in stock today are German, Computer Studies, French, Maths, Physics and Geography at British O and A levels.
EDUCATIONAL TAPES ..... ea $15
or all 18 for $200. Written by Australian teachers conforming to Victorian curriculum. Young Maths, Multiplication, Add & Subtract (2 Tapes), Division, Multiplication, Shipmaths, Race To The Moon, Invadergraph, Swerve Maths, Supermind, Spellstart (4 Tapes), Rocket Spell, Anagram Fun and Word File Maker.

SPECIAL INTERESTS

664-NAME GENEALOGICAL PROGRAM ... D$85
Produces 4, 5, or 6 generation family record charts to the printer or 4-generation charts to the screen. Fully indexed and with easy screen editing, 864 names, plus notes on each person, fit on each disk and several disks may be used.
ANIMAL PEDIGREE PROGRAM ..... D$135
Produces 4 or 5 generation pedigree charts, ownership, mating, breeding, shows and award records with full indexing and easy screen editing. Search function allows easy access (IBM and Apple versions avaialble soon).
TATTS 45 PROGRAM Just Issued ..... D$85
ASTROLOGY PROGRAM $85
(Also for Apple II + and IBM Pc). Based on program used world-wide by professional astrologers. Provides individual horoscopes for all times and places. Much deeper than the pop-style sun astrology you see in magazines. Basically geocentric but heliocentric is possible. Koch system of Houses and Tropical Zodiac but Western Sidenial is an option. Student guide lets you ask the computer questions like: What does a Gemini rising sign mean?

128 PROGRAMS IN STOCK

TURBO-ROM 128
CONSULTANT (Data Management)
WORD PRO 128
PAPERCLIP (Word Processor)
DATA MANAGER 128 w/- Report Writer
SWIFTCALC SIDEWAYS
SWIFTCALC W/SIDEWAYS
JANE
WORDWRITER
GATO Compose, engineer, explore music without the need to know programming or music. Prints out sheet music.
FINANCIAL TIME MACHINE
HALLEY PROJECT
SIDEWAYS
SPEEDSCRIPT 128
SUPERBASE 128 V2.0

ST PROGRAMS IN STOCK

BORROWED TIME
BRATACCUS
TRANSYLVANIA
FARENHEIT 451
CRIMSON CROWN
HEX
SUNDOG
NINE PRINCESS
PERRY MASON
KINGS QUEST II
ULTIMA II
LANDS OF HAVOC
MUD PIES
FLIGHT SIMULATOR
PERSONAL PASCAL
HABA WRITER & MAIL MERGE
HABA LETTERS
EXPRESS
H & D DATABASE
DISK DOCTOR
OBJECT EDITOR
MAPS AND LEGENDS
2-KEY ACCOUNTING
HOME PLANETARIUM
CP/M EMULATOR
VIP PROFESSIONAL
PRO BUSINESS LETTER
HOMEWORK HELPER
FINAL WORLD
RAM DISKS
SOFT SPOOL
Michtron Utilities
M-COPY
M-DUPE
DEGAS
ZOOMRACKS
RHYTHM
HIPPO-C COMPILER
MACRO ASSEMBLER
META PASCAL
HUNDREDS MORE COMING DAILY

WORD PROCESSORS

KWIK-SPELL
TOTL WRITER: The latest full feature word processor including spell checker and database.
TOTL TEXT: Automatically inserts up to 14 lines of footnotes at the bottom of each page which makes it popular with academics. All the usual features, such as headers, footers, page numbering, block move and delete. The last file you've replaced with an update stays on the disk in case you've made an error. We've used this and its predecessor happily for more than a year. RUN magazine (January 1984) compared the previous version very favorably with more than a dozen others. This is even better.
VIZAWRITE
CUT & PASTE
FLEET SYSTEM 2
OMNIWRITER & SPELLER
EASY SCRIPT
INSTAWRITER
SOFT SMITH
HES WRITER 64
QUICK BROWN FOX
WORDCRAFT
MIRAGE PROFESSIONAL W/P
TEXT-PRO/DATA-PRO
WORD PRO 64
QUICK BROWN FOX
INSTAWRITER
SOFTSMITH
SUPER SCRIPT 64
WORD PRO 3 PLUS

PUBLICATIONS

ARGUS TAPE COMPUTING MAGAZINES: Every issue has games, utilities, etc. on tape, unprotected so can get inside them to see how they work. Titles are 64 TAPE COMPUTING, VICTAPE COMPUTING, ATARI COMPUTING, SPECTRUM COMPUTING and MODEL B COMPUTING.
AMAZING COMPUTER.
COMPUTER MAGAZINES: Atari User, Amiga World, Run, Compute!'s & Gazette, Antic, Analog and many more. DELIVERED BY AIRMAIL MONTHS AHEAD OF THE NEWSAGENT.

Freight, packing, etc is charged at a flat $3 per order, irrespective of weight, items or destination.

UTILITIES

PRINTMASTER
ART GALLERY 1
CAD PAK
BASIC 64 COMPILER
MASTER 64: The ultimate professional software development package. Adds almost 100 commands to the 64. Programs developed with it can be distributed with the runtime package free of royalties.
ABACUS BASIC COMPILER C64: BASIC Compiler. High Speed P-Code small P-code execution, runtime routines (6K bytes) are only added to the starting program thus saving disk space, extensions to standard BASIC can be used in compiled programs, program overlays possible, variables can be passed between chained programs and compiled programs can be protected. Calling programs can be longer or shorter than the called program.
PETSPEED: 64: Commodore's own Basic compiler that is a powerful optimizer. Old but still popular.
EPYX FAST LOAD
DESIGNER PENCIL
PAINT BRUSH
SYNTHY 64
SYNTHY COMPANION ALBUM
ASSEMBLEY LANGUAGE COURSE
MACHINE CODE TUTOR
COMPUTER MAINTENANCE KIT
ISEPIC
X-REF 64
TURBO BASIC
TURBO 64 UTILITIES
COCKROACH TURBO ROM 64
COCKROACH TURBO ROM 128
MACHINE LIGHTNING including basic lightning
TOOLBOX 64 includes Power 64 & PAL 64
SPEED BASIC
NEWSROOM: Designed to print and produce a newsletter for your class or club. Over 600 pictures.
CLIP ART COLLECTION: For use with Newsroom. 600 more pieces of Art.
PRINT SHOP
PRINT SHOP GRAPHIC LIBRARIES 1, 2 or 3
DESIGNER'S PENCIL
PAINT BRUSH
KWIK-DRAW
MIND PROBER
MIND OVER MINORS
SKY TRAVEL: Best astronomy program available. Find Halleys Comet with it! Gives you features of each star and planet.
PRINTER GRAPHICS UTILITY
MUSIC STUDIO: The best music creation program available.
64 DOCTOR
1541 PHYSICAL EXAM
1541 DISK ALIGNMENT KIT: 2 Books, 2 Disks (Program Plus Sign Alignment) and Track Signal Detector allows you to do all routine maintenance on your 1541.
C64-C128 LIGHT PENS: Complete with Software to draw, play games, fill in 16 colours and Save and Load.
DOODLE: Most advanced graphics package around.
CHART PAK: Design circuit, houses, gardens. Anything.
FLOW CHARTER: Produces Flow Charts after you have finished your program!
THE FINAL CARTRIDGE: Includes: Monitor, disk & tape, turbo, hires dump, printer interface, 4K extra RAM, BASIC 4.0, BASIC toolkit, reset keyboard utilities, programmable function keys.
MICRO-PROLOG 64 A1: Directly addresses screen graphics. Includes a prolog editor. New for the C64, this key artificial language has proved its worth in broadening the application of logical analysis.
CODE-PRO 64
OXFORD PASCAL (new edition)
BASIC PROGRAMMING
FORTH 64 Commodore
FORTH (Abacus)
SUPER C (ABACUS)
C POWER (532 page manual, D)
Z-80 CARTRIDGE
ZOOM!: Machine language monitor, assembler, DOS.
HESMON
BLITZ! Compiler
COMAL 14 Tutorial
MAE 64: Maco Assembler/Text Editor
SUPER PASCAL (ABACUS)

AMIGA™

ATARI ST™*

Software and accessories from around the world.
● HARD DISKS ● EXTRA RAMS ● LOTS MORE

4 MODELS NOW IN STOCK

More than 500 software titles now available.

BANKCARD ● MASTERCARD ● VISA

3 YEAR WARRANTY with guaranteed 24 hour maximum service time (we loan you a replacement) available on all equipment sold by Chambers. **SERVICED AUSTRALIA-WIDE**

* We can supply Amiga and Atari and all available accessories from our local stock or you may buy it at US prices by sending payment to CHAMBERS COMPUTER SUPPLIES in California and arrange your own shipping, customs clearance, duty and sales tax payment. Direct shipments do NOT get free service in Australia.

CHAMBERS COMPUTER SUPPLIES

2nd Floor, Curtin House, 252 Swanston Street, MELBOURNE 3001 (03) 663 4441
1st Floor, Crest Hotel, 111 Darlinghurst Rd, KINGS CROSS 2011 (02) 356 3155
(Directly above Kings Cross Railway Station and Crest covered car park)

WE LOVE MAIL ORDERS

VISA • MASTERCARD BANCARD WELCOME
ALL ORDERS ARE SHIPPED WITHIN 24 HOURS
FOR ITEMS CURRENTLY IN STOCK. POSTAGE & PACKING $3 PER ORDER ANYWHERE IN AUSTRALIA.

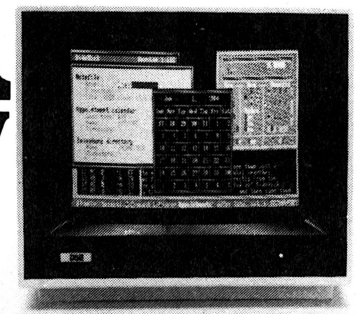
TO ORDER PHONE
MELB. (03) 663 4441
SYDNEY (02) 356 3155

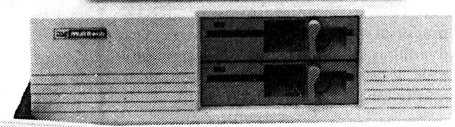
THE BIGGEST RANGE OF SOFTWARE AND ACCESSORIES IN AUSTRALIA We import directly hundreds of lines unique to us. Drop in and check our huge range

WHAT PRICE ?

IT'S HERE!

IBM COMPATIBILITY





". . . . pretty impressive for a machine that is truly IBM compatible and, apart from memory restrictions, will run, as far as I have been able to ascertain, any IBM piece of software straight out of the box with no trouble at all. All for less than $1,400."

Gareth Powell, Computer Editor, Sydney Morning Herald

THE ALL NEW DSE Multitech

$1395

ACC Credit Line

Model shown is twin disk drive 'System 2' — see below.

Monitor shown not included in price.

Gareth Powell again: *"If you want to go a step further there is an extended machine with 256K of random access memory, MS-DOS and two disc drives. Or you can go even further to a system with a hard disc . . . Even more important than the price is the fact that with the two upmarket packages Dick Smith Electronics will install the system in your office or home free — and will also provide you with six months' on-site service . . . ."*

Yes! The highest quality — at the lowest price. That's the new DSE Multitech. We've looked at hundreds of compatibles overseas: the Multitech, from possibly the largest manufacturer outside the US, is the only one that meets our stringent quality standards.

And we back up this quality with rigorous QC, installation, on-site service . . . everything today's business demands. We **can** supply!

If you've been thinking about a computer for your business, but have been put off by the price, now's the time to think again. To quote Gareth Powell once more: *"What all this means is that full-scale computing power is now well within the reach of the smallest business".*

Want to see the rest of Gareth Powell's article . . . and a copy of the all-new DSE Multitech Computer Information Pack? Send in the coupon below. There's no obligation!

Want a test drive (and an information pack)? Call into your nearest DSE Computerstop store. You'll be glad you did!

Choose the system you require:

System 1: 360K disk drive, 128K RAM & MS-DOS 2.11. The ideal way to start! Cat X-8000 **$1395**

System 2: Two 360K drives, 256K RAM, MS-DOS 2.11, "EASY" word processing package PLUS six months' on-site service. Cat X-8001 **$1995**

System 3: The powerful work-horse: Fully expanded with one 360K drive, one 10Mb hard drive, 512K RAM, "AURA" integrated business software (word processing, database, spreadsheet & information management) PLUS six months' on-site service AND free installation. Cat X-8002 **$3995**

* Capital Cities (exc Darwin) & Newcastle only.

DICK SMITH ELECTRONICS COMPUTERSTOP

• NSW • Albury *21 8399* • Bankstown Square *707 4888* • Blacktown *671 7722* • Blakehurst *546 7744* • Bondi Junction *387 1444* • Brookvale *93 0441* • Campbelltown *27 2199* • Chatswood Chase *411 1955* • Chullora *642 8922* • Gore Hill *439 5311* • Gosford *25 0235* • Hornsby *477 6633* • Liverpool *600 9888* • Maitland *33 7866* • Newcastle *61 1896* • North Ryde *88 3855* • Parramatta *689 2188* • Penrith *32 3400* • Railway Square *211 3777* • Sydney City *267 9111* • Tamworth *66 1711* • Wollongong *28 3800* • ACT • Fyshwick *80 4944* • VIC • Ballarat *31 5433* • Bendigo *43 0388* • Box Hill *890 0699* • East Brighton *592 2366* • Coburg *383 4455* • Essendon *379 7444* • Frankston *783 9144* • Geelong *43 8522* • Melbourne City *67 9834* • Richmond *428 1614* • Springvale *547 0522* • QLD • Brisbane City *229 9377* • Buranda *391 6233* • Chermside *359 6255* • Rockhampton *27 9644* • Southport *32 9863* • Toowoomba *38 4300* • Townsville *72 5722* • Underwood *341 0844* • SA • Adelaide City *212 1962* • Darlington *298 8977* • Enfield *260 6088* • Salisbury *281 1593* • WA • Cannington *451 8666* • Fremantle *335 9733* • North Perth *328 6944* • Perth City *481 3261* • TAS • Hobart *31 0800* • NT • Stuart Park *81 1977*

Or order through DSXpress with your Bankcard, Mastercard or VisaCard: Just phone (toll free) (008) 226810 for fast despatch of your order. (Sydney calls or enquiries please phone (02) 888 2105 or write to address at right)

Want to know more? Send for your FREE information pack. It's obligation free:

Name: .....

Address: .....

Postcode: ..... Phone .....

Drop into any Dick Smith Electronics store or send to DSXpress (PO Box 321, North Ryde NSW 2113)

B086

I've recently seen one of the most amazing C64 programs yet released — Vizastar, a sort of Lotus 1-2-3 for the C64. It combines a spreadsheet with a database and business graphics package, and the whole thing fits into the C64's memory with about 10 Kbytes to spare.

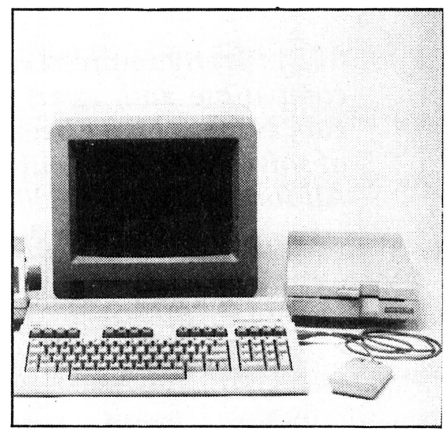
I RECENTLY had a look at the Commodore 128D, the sister machine to the C128 in much the same way as the SX-64 was to the C64. Like the SX, the 128D is designed to be luggable, and its keyboard clips neatly into its disk drive to make a unit you can carry with one hand. Unlike the SX, the 128D is not supplied with an in-built monitor, but I don't think that's any great loss. Monitors on luggables are necessarily small, particularly colour ones — I always found the tiny SX monitor very uncomfortable on the eyes and would much rather have used my free hand to carry around a usable-sized screen.

The 128D looks like a PC clone in that it has a detachable keyboard and a system box containing the drive. The drive is a 1571 (yes — a real double-sided 1571), and the keyboard is identical to the standard 128 without the bit at the back — that's now in the system box. The keyboard has little feet that swivel out to provide the correct angle of tilt.

Its memory map and firmware are exactly the same as the 128 (which means 64, 128 and CP/M modes), and this time Commodore remembered to include a cassette port. While few users ever work with cassettes for serious computing, some printer interfaces are specifically designed to plug into the cassette port (thus freeing the expansion port and cartridge slot for other uses). Besides, there are heaps of games on cassette. The absence of a cassette port on the SX-64 was a continuing source of frustration for some users.

The 128D does have one surprising characteristic: noise. Its built-in fan kicks off the moment you turn on the power, and is obviously there to cool the internal power supply (one less thing to carry around). Maybe, just maybe, this internal power supply doesn't have the same glitch that causes the standard 128 to blow CMOS printer interfaces when switching from 128 to 64 modes (I wasn't about to test for this!)

All in all it's quite an appealing unit. Its luggability (even with a monitor in the other hand) is very attractive, especially if you ever have the need to cart your computer from A to B, but it's real attraction is its relatively low cost.



With a recommended retail price of $1099, *the* 128D *works out at about* $200 *cheaper than the separate prices of a standard* 128 *and* 1571 *drives.*

Amiga Update

Amigas have been available in Australia since before Christmas, but not from Commodore. These machines were United States models brought in directly, which meant they were configured for NTSC video. NTSC video is the standard used in the United States and Japan and is incompatible with our PAL television standard NTSC is no great obstacle as long as you have the appropriate monitor, and these were supplied with the imports.

Commodore now says it will have the Amiga available by the time you read this but will initially be releasing only NTSC versions. Whether a PAL version is in the works is yet to be seen. Commodore is vague on this, but I can't see how it could ignore the entire European market as well as Australia.

Either way, my observation is that people who buy a computer in this price range only do so when they can see it filling a

BY IAN ALLEN

particular need. After all, a computer is merely a tool, and if you need the Amiga's features and power you're not going to worry too much about whether the monitor can double as a video screen (unless, of course, you need to video record its graphic output).

Vizastar

All this talk of new computers shouldn't worry C64 users. I've recently seen one of the most amazing programs yet released for the 64. A friend of mine just back from holidays in the United States acquired a copy of Vizastar, a sort of Lotus 1-2-3 for the C64. It combines a spreadsheet with a database and business graphics package, and the whole thing fits into the C64's memory with about 10 Kbytes to spare.

It's an integrated package, meaning you can transfer data from the database into the spreadsheet, manipulate it and then send it back to the database. It is menu-driven and very easy to learn, and is also blindingly fast (except when the 1541 is required to read data). The manual claims the entire program is written in 6502 machine language, and its speed certainly supports the claim. It's much faster than Multiplan.

Vizastar supports most printers for text output, but for graphic dumps of its pie, line and bar graphs (some in 3D) you need an Epson lookalike or a Gemini Star. You can also use the 1001 or 8250 disk drives, provided you have a proper IEEE interface. These drives are about 10 times faster than the 1541 and store 1 Mbyte of data per double-sided diskette.

Vizastar is supplied with a system cartridge and a program diskette, plus a very well-written manual. It represents proof that the C64 can function as a viable business machine. The only catch seems to be that I can't find a local distributor. My friend bought his copy from a company called Solid State Software of 1125 E. Hillsdale Boulevard, Suite 104, Foster City, California, USA; phone (415) 341 5606. I rang the company and spoke to a man called Mike Deselva, who informed me a 128 version now exists. This has a full 80-column display and provides 63 Kbytes of workspace area on a standard 128. On a 512 Kbyte 128 (Commodore USA has released the RAM expansion pack) Vizastar has a massive 473 Kbytes of workspace. That, coupled with the fast 1571 drive, sounds like dynamite.

Both the 64 and 128 versions cost $US120, plus around $20 for airmail postage. □

Everything you need at the right price! compliments of Rod Irving Electronics

APPLE* COMPATIBLE SLIMLINE DISK DRIVES

Japanese Chinon mechanism, compatible with 2E and 2 plus.
Cat. X19910 **Only $249**

Japanese Chinon mechanism,
Cat. X19901 Normally $225
NOW $199
(*Apple is a registered trade mark.)

20 M/BYTE HARD DISK DRIVE FOR IBM* AND COMPATIBLES

Includes disk controller card.
Cat. X20010 ..... **$1,250**
*IBM is a registered trade mark

MITSUBISHI DISK DRIVES

MF353 (3½" DRIVE)
Double sided, double density, 1 M/Byte unformatted, 80 track per side.
Cat. C11953 **$280**

MF351
3½" Standard size disk drive. Single sided, double density.
Cat. C11921 **$225**

M2896-63
Slimline 8" Disk Drive, Double sided Density No AC power required. 3ms track to track, 1.6 Mbytes unformatted, 77 track side 10s/su10 bit soft error rate.
Cat. C11916 **$550**
Case & Power Supply to suit
Cat. X11022 **$159**

M4854
Slimline 5¼" disk drive. Double sided, double density, 96 track/inch, 9621 bit/inch, 1.6Mbyte unformatted 3ms track to track access, 77 track/side.
Cat. C11904 **$350**
Case & Power Supply to suit.
Cat. X11011 **$109**

M4853
Slimline 5¼" disk drive, Double sided, double density, 1 Mbyte unformatted, 3ms track to track, 80 track/side, 5922 bits/inch.
Cat. C11903 **$260**

M4851
Slimline 5¼" disk drive. Double sided, double density 500K unformatted, 40 track/side. Steel band drive system.
Cat. C11901 **$219**
Case & Power Supply to suit
Cat. X11011 **$109**

M4855
Slimline 5¼" disk drive, double sided, double density, 96 track/inch. 2.0 Mbytes unformatted.
Cat. C11905 **$385**

RITRON MULTI PURPOSE MODEM

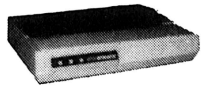
The RITRON Multi Purpose Modem has all the features you require...

- CCITT V21 300 Baud Full duplex
- CCITT V23 1200/75
- Bell 103 300 Full duplex
- Bell 202 1200 Half duplex
- Auto answer, auto disconnect.

Telecom Approval No. C84/37/1134
Cat. X19103 Normally $399
SPECIAL $299

1200/75 BAUD RATE/BIT CONVERTER

For computers not capable of split baud rates. Buffers characters at 1200 and converts to 75 baud
Cat. X19105 **$99**

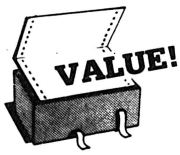


SUPERB KAITEC 180 C.P.S. PRINTER

Epson FX80 compatible, standard 80 column dot matrix, Near Letter Qulaity mode, and 3K buffer!
Cat. C20020 **Only $499**

JUKI PRINTER

Professional daisy wheel printer 18CPS full incremental mode Diablo 630 emulation. Large range of daisy wheels. 8K internal buffer available.
Cat. C20040 **$795**



COMPUTER PAPER

Quality paper at a low price! 2,500 sheets of 11 x 9½", 60 gsm bond paper.
Cat. C21001 **Normally $44.95**
SPECIAL $37.95

APPLE* COMPATIBLE CARDS

Printer Card Cat. X17029 **$89**
Drive Card Cat. X17019 **$95**
80 Column Card Cat. X17025 **$109**
Speech Card Cat. X17009 **$69**
Music Card Cat. X17011 **$99**
Super Serial Cat. X17035 **$129**
RGB Card Cat. X17039 **$79**

IBM COMPATIBLE CARDS

NEW MOTHER BOARDS!
XT compatible mother boards, 8 slots, room for 256K RAM
Cat. X18020 **$295**

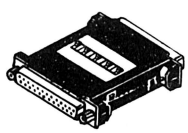
GAMES ADAPTOR CARD
Features 2 joystick ports.
Cat. X18019 **$49**

MULTIFUNCTION CARD
(384K RAM) Parallel, serial and game port. Plus battery backup clock.
Cat. X18013 **$329**

DISK CONTROLLER CARD
Controls 2 slimline drives
Cat. X18005 **$89**

HIGH RESOLUTION MONOCHROME GRAPHICS CARD
Give your IBM real graphics capability.
Cat. X18007 **$249**

512K RAM CARD
Including RAM Cat. X18015 **$299**
Excluding RAM Cat. X18016 **$129**



INLINE SWITCHING BOX

- 25 pin "D" plug to 25 pin "D" socket (RS232)
- DIP switches allow easy switching of internal wiring.

Cat. P00000 **$32.95**

RS232 GENDER CHANGERS

Saves modifying or replacing non-mating RS232 cables by changing from male to female to male. All 25 pins wired straight through
Male to male Cat.X15650 **$19.95**
Female to female Cat.X15652 **$19.95**

NEW TTL MONITORS

Fantastic resolution! Enjoy a crisp, sharp image with these new Ritron TTL monitors! IBM* compatible, green display, swivel and tilt base.
Cat. X14510 **$265**

IC SPECIALS!

	1-9	10+	100+
4116	$1.80	$1.70	$1.60
4164	$3.95	$3.75	$3.50
2716	$5.90	$5.50	$5.50
2732	$6.25	$5.95	$5.50
2764	$6.25	$5.95	$5.00
27128	$7.00	$6.50	$6.25
6116	$2.95	$2.75	$2.50
41256	$7.00	$6.50	$6.00
6264	$6.50	$5.50	$5.25
27256	$12.50	$11.50	$10.00

WORLD MODEM CHIP

Cat. U21614 Normally $49.50
Save $20, SPECIAL $29.50

PHOENIX 5

Suits Apple, IBM, Commodore, even your VCR!
- Pal and R.G.B.
- Normal Resolution
- 13" CRT Dot Pitch 0.65mm
- Horiz. Resol. 320 TV lines
- Vert. Resol. 560 TV lines
- Display Characters 1,000 Ch.(40x25)
- 16 Colours (Pal)
- Green text display

Cat. X14522 **Normally $499**
SPECIAL $399

COMPUTER CASSETTES

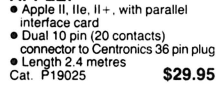
Quality 20 minute tapes.
Cat. D11141

1-9	10+	100+
$1.00	**$0.90**	**$0.80**

FLOPPY DISKS GALORE!!

All prices per 10 disk boxes!

Our Cat. Number	Product's Code	Description	1-9 Boxes	10+ Boxes
XIDEX 3½" DISKS				
C12600	3012-3000	S/S	$69.95 (Normally $75.00)	$64.95
C12602	3022-3000	D/S	$89.95 (Normally $99.95)	$84.95
XIDEX 5¼" DISKS				
C12401	5012-1000	S/S D/D 40 track	$29.95 (Normally $37.50)	$28.95
C12410	5022-1000	D/S D/D 40 track	$36.95 (Normally $47.50)	$34.95
VERBATIM 3½" DISKS				
C12610	MF350	S/S D/D 80 tracks/135 TPI	$69.95	$64.95
C12612	MF360	D/S D/D 80 tracks/135 TPI	$89.95	$85.95
VERBATIM 5¼" DATALIFE DISKS				
C12501	MD525-01	S/S D/D soft sector 40 track	$27.95 (Normally $44.95)	$26.95
C12504	MD550-01	D/S D/D	$39.95 (Normally $49.95)	$37.95
C12505	MD550-10	D/S D/D 10 sectors 40 tracks	$61.20	$56.95
C12507	MD577-01	S/S D/D soft sectors 80 tracks	$61.20	$56.95
C12510	MD577-01	D/S D/D soft sectors 80 tracks	$75.60	$68.95
VERBATIM 5¼" VALULIFE DISKS				
C12421		S/S D/D	$34.95	$32.95
C12421		D/S D/D	$37.95	$35.95
VERBATIM HIGH DENSITY 5¼" DISKS				
C12520	MD/HD	D/S H/D soft sector	$99.95 (Normally $109.95)	$89.95
VERBATIM 8" DISKS				
C12811	DD34-4001	D/S D/D	$63.60	$57.50
C12814	DD34-4026	D/S D/D	$66.00	$59.95
HEAD CLEANER DISKS				
C12551		5¼"	$12.60	$10.95
C12851		8"	$14.30	$11.95



COMPUTER LEADS

We have a wide range of computer leads available, all at low prices!

APPLE:
- Apple II, IIe, II+, with parallel interface card
- Dual 10 pin (20 contacts) connector to Centronics 36 pin plug
- Length 2.4 metres

Cat. P19025 **$29.95**

IBM
- IBM PC, XT, and look alikes with 25 pin "D" plug on computer end to Centronics 36 pin plug on printer end.
- Length 2.1 metres

Cat. P19029 **$44.95**

REPLACEMENT KEYBOARDS

- For Apple
- 42 single key BASIC command
- One chip custom design encoder
- Made by ALPS, life time, 10 million operations
- Dimension: L340xW110xH42mm

Cat. K12010 **$79.50**

- For Apple
- 45 built in function keys, BASIC and CP/M command.
- 45 user defined keys
- Built-in shift lock
- Made by ALPS, life time, 10 million operations
- Dimension: L340xW130xH42mm

Cat. K12012 **$99.00**

TELECOMMUNICATIONS AUSTRALIAN STYLE ADAPTOR CABLE

- Australian socket to plug/socket
- Length 10 metres

Cat. Y16015 **$15.95**

TELEPHONE ADAPTOR

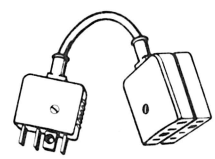
- Australian plug to U.S. socket
- Length 10cm
- Cream colour cable

Cat. Y16026 **$6.95**

TELECOMMUNICATIONS AUSTRALIAN TO U.S. ADAPTOR CABLE

- Australian socket to U.S plug.
- Length 5 metres

Cat. Y16017 **$7.95**



TELECOMMUNICATION PLUG TO 2 SOCKETS.

Ideal for modem connections.
Cat. Y16014 ..... **$12.95**

TELEPHONE CURL CORD

- U.S. plug to U.S. plug
- Replacement hand set cord
- Length 4.5 metres
- Colours: cream, dark brown

Cat. Y16022 **$7.95**

TELEPHONE EXTENSION CABLE

- U.S. plug to U.S. socket
- Length 10 metres
- Cream colour cable

Cat. Y16024 **$8.95**

IBM* COMPATIBLES from $899*

Incredible deals to suit everyone including special package deals!
*256K RAM, single drive, graphics, disk controller and printer cards.
IBM* is a registered trade mark

256K RAM: Colour Graphics, Disk Controller Card, 1 parallel port, 2 disk drives and 3 months warranty. **only $1,495**

640K RAM: Colour graphics, Multifunction Card, Disk Controller Card, 2 serial and 1 parallel ports, 2 disk drives and 3 months warranty. **only $1,750**

256K PACKAGE DEAL: Includes Colour Graphics Card, Multifunction Card, Disk Controller Card, 2 serial and 1 parallel ports. A 120 C.P.S. printer and a monochrome monitor and 3 months warranty! **only $1,850**

640K PACKAGE DEAL: Includes Colour Graphics Card, Multifunction Card, Disk Controller Card, 2 serial and 1 parallel ports. A 120 C.P.S. printer, a monochrome monitor and 3 months warranty! **only $1,950**
*IBM is a registered trademark

ROD IRVING ELECTRONICS
425 High Street, NORTHCOTE. 3070
VICTORIA, AUSTRALIA
Phone (03) 489 8866
48 A'Beckett St. MELBOURNE, 3000
VICTORIA, AUSTRALIA
Ph. (03) 663 6151
Mail Order and correspondance:
P.O. Box 620, CLAYTON 3168
TELEX: AA 151938

MAIL ORDER HOTLINE (03) 543 7877 (2 lines)

POSTAGE RATES

$1-$9.99	$2.00
$10-$24.99	$3.00
$25-$49.99	$4.00
$50-$99.99	$5.00
$100-199	$7.50
$200-$499	$10.00
$500 plus	$12.50

This is for basic postage only. Comet Road freight, bulky and fragile items will be charged at different rates.
Certified Post for orders over $100 included "free"!
Registered Post for orders over $200 included "free"!
All sales tax exempt orders and wholesale inquiries to RITRONICS WHOLESALE, 56 Renver Rd. Clayton
Phone (03) 543 2166

MasterCard VISA

Errors and Omissions Excepted.

Your BONDWELL

BY JEFF RICHARDS

THE BONDWELL is supplied with two installed versions of Wordstar, but neither is set up to take full advantage of the facilities available. This month I will describe a procedure for installing Wordstar to enable direct screen addressing. The improvement in speed is significant, and the procedure is quite simple.

The two supplied versions of Wordstar are the files WS.COM and WSI.COM on the master disk. The only difference between the two versions is WSI.COM implements reverse video as highlighting, which looks so awful I discarded it altogether.

Because Wordstar is pre-configured for the Bondwell, this choice of files is the only installation step required. The installer program, used to tailor Wordstar to specific requirements, is only necessary if you want to use the special features available with some printers.

The suggestion presented here is only one of many customisation procedures available, and is particularly important, since it improves speed considerably.

Start the customisation procedure with your Wordstar master disk in drive A and your Wordstar installation disk in drive B — and, need I say, in each case it's actually your copy of the supplied master disks I'm referring to. Log into drive B with B:<return> and enter WINSTALL <return>. The installer will come up with a polite message, and you're ready to go.

Most of the questions are explained well, so I won't discuss them in detail. The drive for the WS files is A:, and the file to be installed is A:WS (the 'A:' is necessary, despite the previous question). The file to be created can be given a new name — A:WSS (for 'speedy') will do. Alternatively, you can overwrite your current file by nominating the same name, 'A:WS'. In each case, the installer will append the 'COM' part of the filename for you.

Type a single '+' at the main installation menu, to get into the patcher utility. (This is the only complicated part of the procedure.)

We'll patch a series of locations internally to Wordstar, starting at memory location MEMAPV. This is entered as ':MEMAPV' in the patcher, and in my version returned a value of 290h. The contents of memory at this location is zero.

Accept the location returned, and enter the values in Table 1 as simple hex characters, without a ',' or an 'h', and press <return> at the end of each line. We're telling Wordstar we have a memory-mapped video display, that the display is at memory location F800h, and the cursor can be indicated by setting the high bit of a memory location to 1. If you can stand the inverse video for highlighted areas of the screen, you can enter Table 2 instead, which tells Wordstar how to highlight the screen, and to blink the cursor in case it disappears in the highlighting.

Table 1. *No inverse video.*

MEMAPV	FF
MEMAPV+1	00
MEMAPV+2	F8
MEMAPV+3	00
MEMAPV+4	FF
MEMAPV+5	00

Table 2. *Inverse video.*

MEMAPV	FF
MEMAPV+1	00
MEMAPV+2	F8
MEMAPV+3	FF
MEMAPV+4	FF
MEMAPV+5	FF

When all values are entered, end the data entry with a single fullstop and <return>. Exit the patcher with X, and exit the installer with X and A to accept the changes. Start the reconfigured Wordstar with the command WSS (or whatever name you nominated for the file to be created). Any other special patches installed in the original file will be undisturbed.

Wordstar will now run much faster, since characters are displayed by writing them to the screen in the required location, rather than sending them, along with lengthy cursor addressing sequences, to the operating system for interpretation. The cursor will be a single unblinking square, except when it's sitting on a character.

The only hint that anything is different (apart from the greatly increased speed) is the remnant of the original cursor sitting at the bottom left of the screen. If you want to get rid of this, use the program previously mentioned to alter the cursor shape. One version of this program can set the beginning and end scan line to 8, in order to remove the cursor, and another can set them back to your required values, to restore the cursor when you exit Wordstar.

You could call the first version CSROFF-.COM and the second version CSRON-.COM, and install them in your PROFILE-.SUB file before and after the WS command. If you created the patched version of Wordstar with a different name, don't forget to edit PROFILE.SUB to reflect the change.

The only bug I've found in this procedure is the block display in column mode appears to disregard an installation which has specified no highlighting. However, it's worth the inconvenience to pick up editing speed. □

We're telling Wordstar we have a memory-mapped video display, that the display is at memory location F800h, and the cursor can be indicated by setting the high bit of a memory location to 1.

CONTROL SYSTEMS

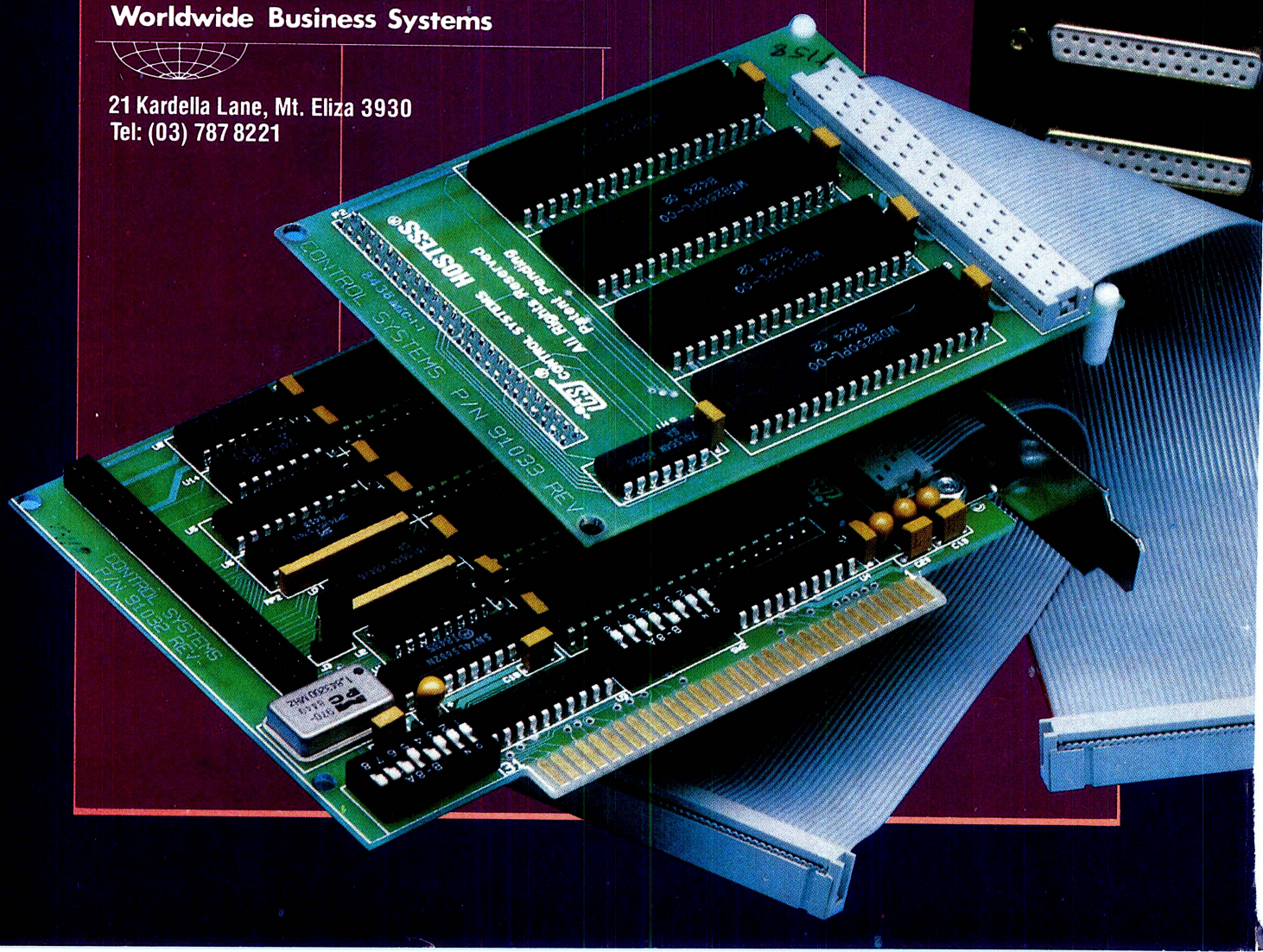
HOSTESS™ and SECURE HOSTESS™

MULTIUSER HOST ADAPTERS FOR YOUR IBM-PC/AT

- ADDS 4, 8 OR 16 SERIAL PORTS TO THE PC, XT OR AT
- CONNECT TERMINALS, MODEMS, PRINTERS AND MORE
- COM 3 THRU COM 18 BIOS SOFTWARE FOR PC-DOS
- SECURITY PAL OPTION TO PROTECT YOUR APPLICATION SOFTWARE
- 16 USER SUPPORT FOR IBM XENIX
- CLOCK/CALENDAR OPTIONAL

Worldwide Business Systems

21 Kardella Lane, Mt. Eliza 3930
Tel: (03) 787 8221



INTERFACING assembler routines with high-level languages seems to be something textbook authors all avoid like the plague. Assembler texts all assume a textbook on BASIC will cover interfacing to that language, and textbooks on BASIC rarely if ever mention assembler, and even then the interfacing is glossed over. The situation is much the same with other languages, such as Pascal.

Last month in this column I published a little assembler routine to read the day of the week from DOS and display it as a number on the screen. By itself it had little importance, but this month I have expanded the routine and incorporated it into an interpreter BASIC program. Variables within the BASIC program are passed to the assembler routine, which reads the DOS date function and returns the year, month, day in the month and day of the week to the BASIC program. This procedure of transferring variables is more correctly known as parameter passing.

Program Structure

The program is written as three blocks. Lines from 60000 up to 60300 create the machine language routine from a series of data statements and load it into a string. Lines 50000 to 50110 run the machine language routine and print the results to the screen. Lines 100 to 200 are just a program fragment to call the two subroutines.

Using assembler routines in more ambitious programs would follow a similar structure — with the main program calling subroutines at high line numbers to create and run the assembler routine.

One of the tricky parts of interfacing interpreter BASIC and assembler routines is making sure the assembler is loaded into memory at an address that does not conflict with the needs of the BASIC interpreter or its workspace. With most PCs having memory sizes ranging from less than 64 Kbytes (rare these days) to 640 Kbytes, finding an address outside BASIC that will be valid for all machines is rather difficult.

In this program we get over the problem by putting the assembler routine in a string variable MACHINE$ inside the BASIC workspace. Having created a blank string in line 60040, lines 60050 to 60100 read the data statements and create the machine language routine. Lines 60110 to 60130 then determine the starting address of the routine and store it in the variable MACHINE!.

One of the tricky parts of interfacing interpreter BASIC and assembler routines is making sure the assembler is loaded into memory at an address that does not conflict with the needs of the BASIC interpreter or its workspace.

Line 50010 calls the machine language routine at the address stored in the variable MACHINE!. Four variables — A%, B%, C% and D% — are passed from BASIC to the routine. Integer variables are required — other variables will not be successful. Lines 50030 to 50110 then just print the variables to the screen.

The Assembler Routine

Now for the tricky bit. I have written the data statements line for line as the assembler mnemonics would be written, and have shown the assembler mnemonics at the right on the same line. The colon tells the READ statement in line 60060 to ignore the mnemonics. All numbers are in hexadecimal (base 16), so 0C is a number. Lines 60160 and 60170 save the stack pointer and base pointer.

DOS has a system of interrupts to perform a number of activities. One is interrupt 21(hex), sometimes called the umbrella interrupt as some tens of functions can be called by it. This is done by loading the function number into the AH register, and then interrupt 21 executes the function selected by that number. Function 2A is the DOS GETDATE function, and returns the year, month, day of month and day of week to the CX, DH, DL and AL registers. Line 60180 selects function 2A, while line 60190 executes DOS interrupt 21.

Now we must get the results back to BASIC. Line 60260 loads the address of one parameter into the SI register. Line 60270 then moves the data in the DL register to the address of the parameter. Similarly, lines 60200 to 60250 move data from three other registers to the other three parameters. Line 60290 then returns to BASIC and tells the routine to take 8 bytes from the stack — two for each parameter.

References

I'm sure the information above will whet your appetite for more. Two books which I have found of great help and interest are:

- *Programmer's Guide to the* IBM-PC, by Peter Norton (Microsoft Press).
- *Mapping the* IBM-PC *and* PC*jr*, by Russ Davies (Compute Books).

The Norton book is one of the best references I have found to the software side of the PC design, and is a comprehensive guide to the DOS functions and interrupts. Chapter 20 on programming languages is excellent, as is the section in Chapter 8 on assembly language interfaces.

Davies' book is chock-full of reference material and sample programs. Check out page 124 for a program which accesses the speaker through a machine language program in a string. My program is quite different, but the structural similarities emphasise the principles involved.

The Next Step

This is a rather trivial example, but remember that over 80 functions can be called by interrupt 21(hex). What I have basically given is a skeleton which can be fitted inside your interpreter BASIC program, and which passes four parameters to a machine language routine. Take a look at the Norton book and I'm sure you'll find a plethora of ideas to move on to. Users of most well-known compilers will also find heaps to fascinate them.

Warning

Assembler can be dangerous! There is no error checking other than the routines the programmer provides. An error can cause the machine to lock up, erase disks (rare) or do other odd things. Before running the program above, or any other assembler routine, make sure your hard disk is backed up and all valuable diskettes are out of the drives — then an error can't do major harm. If the machine locks up you will probably need to switch it off and reboot — just part of the fun of assembler! □

BY JOHN HEPWORTH

```
100 'GET-DATE.ASC
110 'A program which uses BASIC CALL to
120 'ml routine in a string to access the
130 'DOS interupt 21, function call 2A
140 'to get day of week, day of month, month
150 'and year from DOS
160 '
170 GOSUB 60000
180 GOSUB 50000
190 END
200 '
50000 'run machine language routine
50010 CALL MACHINE! (A%,B%,C%,D%)
50020 '
50030 IF A%=0 THEN PRINT"Sunday, ";
50040 IF A%=1 THEN PRINT"Monday, ";
50050 IF A%=2 THEN PRINT"Tuesday, ";
50060 IF A%=3 THEN PRINT"Wednesday, ";
50070 IF A%=4 THEN PRINT"Thursday, ";
50080 IF A%=5 THEN PRINT"Friday, ";
50090 IF A%=6 THEN PRINT"Saturday, ";
50100 PRINT D%;"-";C%;"-";B%
50110 RETURN
60000 '
60010 '------ LOAD ML ROUTINE -------
60020 DEF SEG
60030 'make a string for the ml routine
60040 MACHINE$=SPACE$(255)
60050 I=I+1 'Start of loop to read data.
60060 READ X$
60070 IF X$="/*" GOTO 60100
60080 MID$(MACHINE$,I,1) = CHR$(VAL("&H"+X$))
60090 GOTO 60050
60100 '
60110 MACHINE!=VARPTR(MACHINE$)
60115 TEMP!=PEEK(MACHINE!+1)
60120 MACHINE!=TEMP!+(PEEK(MACHINE!+2)*256)
60130 RETURN
60140 '
60150 '---- machine language routine ----
60160 DATA 55          : PUSH    BP
60170 DATA 8B,EC       : MOV     BP,SP
60180 DATA B4,2A       : MOV     AH,2A
60190 DATA CD,21       : INT     21
60200 DATA 8B,76,0C    : MOV     SI,[BP+0C]
60210 DATA 88,04       : MOV     [SI],AL
60220 DATA 8B,76,0A    : MOV     SI,[BP+0A]
60230 DATA 89,0C       : MOV     [SI],CX
60240 DATA 8B,76,08    : MOV     SI,[BP+8]
60250 DATA 88,34       : MOV     [SI],DH
60260 DATA 8B,76,06    : MOV     SI,[BP+6]
60270 DATA 88,14       : MOV     [SI],DL
60280 DATA 5D          : POP     BP
60290 DATA CA,08,00    : RETF    0008
60300 DATA /*
```

BY BRUCE MITCHELL

More on the Master

Last month I attempted to give a brief rundown on the new line-up of BBC models; in case you were wondering about discrepancies between the prices I quoted and those being asked by dealers, it has a lot to do with sales tax! The cost of the 80286 version is exactly twice that of the basic 128, while the 32016 model's price doesn't bear thinking about unless you have inside information about the next numbers to come up in Lotto. At over $5000 it isn't for the faint-hearted hobbyist.

After a short time with the Master I found that as far as compatibility with existing software is concerned there is little to worry about unless you are addicted to 'Elite' and other heavily protected Acornsoft games. The machine couldn't be configured to cope with these despite all our attempts, so I hope the distributors will provide some kind of exchange/upgrade service for Master purchasers who already possess these disks.

The 80286 board is worth a second look if only for the sight of the copyright message: "BBC Computer 512K". To say DOS+ is compatible with IBM PC-DOS is like saying all cars are compatible because they have steering wheels; the differences are enough to make any thoughts of the Master 512 being a PC-lookalike quite absurd. However, it did make valiant attempts to use well-written PC software that wasn't choosy about memory segmentation and irreverent POKEing, something one machine made by IBM, more expensive than the Master 512 with half the memory, usually can't cope with!

John Coll's *User Guide* for the Model B was a masterpiece of clear, informative writing for all levels of users. The same can't be said for that supplied with the Master. In a word, it is deficient. (If you don't believe me, try using the built-in terminal software.) Purchasers are expected to buy the full manuals separately, a marketing strategy which is comparable to a motorist having to pay extra for the ignition key to a new car. This approach can do nothing toward bringing computer dealers into higher repute than their automotive counterparts.

To say DOS+ is compatible with IBM PC-DOS is like saying all cars are compatible because they have steering wheels; the differences are enough to make any thoughts of the Master 512 being a PC-lookalike quite absurd.

Although programmers who honed their skills within the confines of the old 32 Kbyte model will probably suffer from agoraphobia for their first few programs, I'm looking forward to seeing some of the software that will take advantage of the Master's superb facilities.

AMX Mouse Revisited

The AMX mouse is dead, not as a result of the comments made last time, but because the AMX Super Mouse has replaced it. For the same price you now get a mouse which is mechanically far superior and a 16 Kbyte ROM which, while compatible with the old 8 Kbyte version, contains many powerful enhancements. The disk-based software has been redesigned to include facilities that make last month's comparison with Mousepaint look silly — one would now have to switch to Macpaint to find something comparable.

Super Art allows you to prepare enormous pictures (presumably for printing, until the arrival of Cinemascope monitors). Place a matchbox on a sheet of A4 paper; the paper represents the picture, the matchbox the screen window. Zoom facilities are now in the program to allow you to potter around changing pixels, each individually coloured, in mode 1. A great piece of software!

More Software

If you're tired of word processors that force you to imagine what your finished page is going to look like, take a careful look at Proword. This package takes the what-you-see-is-what-you-get concept about as far as it can go. It shows all those italics, superscripts, double-width, emphasised and other fancy styles you can get from your dot matrix printer, on the screen as you type. You can select from a wide range of paper sizes and, if you have a printer with downloading ability, even define your own characters. At $87.50 it is a serious competitor for View, especially as it has the mailmerge and printer driver generation facilities View lacks.

Have you ever tried to write a graphics program that uses the fine detail of mode 0, only to run out of memory before you finish your initialising routine? Gaze upon Diagram and weep! This CAD program costs around $90, yet allows you to draw and store large, detailed drawings and text on a single disk.

Scrolling smoothly across the sheet, which can be up to four screens wide and three screens high, you'll find drafting facilities you would expect in a program costing thousands of dollars. Items on the drawing can be indexed so that finding, say, R287 on a circuit diagram takes about as long as loading one disk sector. Diagram is compulsory viewing for anyone looking for CAD software.

Software was supplied for review by AK Microsystems, Strathpine, Queensland. □

AMPEX 230

The Wise Alternative

Introducing the latest Ampex product into Australia, the 230 terminal; setting new standards in features and value-for-money.

The 230 follows on from the incredibly popular Ampex 210. It is a terminal that the wise should consider when evaluating top-of-the-range terminals.

Why?

Because the 230 is super smart, with a 14" amber CRT and selectable 80 or 132 column mode.

It has been specially designed for the modern office, and boasts ergonomic styling, Selectric style adjustable keyboard and tilt-and-swivel display.

Other outstanding features of the 230 include:

— High level emulations including the entire Ampex family, Televideo up to the 950 and the WYSE WY-50.
Note: DEC emulations are not supported by the 230. These will be available in the 220 terminal, which will be released soon.

— 15 line and 64 block graphic symbols.

— Two standard 80 column display pages, expandable to four.

— 32 programmable function keys with memory expandable to 6,400 bytes.

— Addressable cursor with double high and wide characters and a four speed scroll.

— A primary and auxiliary port with a baud rate to 38.4K.

The Ampex 230 is supported throughout the nation by Datascape, Australia's largest independent peripheral supplier.

If you're still not convinced then check the price. It will prove just how wise you are to select the 230.

Mail coupon to:
Datascape.
Sydney office: 44 Avenue Rd, Mosman. Tel. (02) 969 2699.
Melbourne office: 183 Bank St, South Melbourne.
Tel. (03) 690 3622.
I would like to know more about the Ampex 230 terminal. Please
☐ send literature
☐ call me

Name .....

Title.....

Company.....

Address.....

.....

Phone.....

cw

DATASCAPE

Freedom for your information

YC586

AD INDEX

SERVICES

LETTERS TO THE EDITOR

We are happy to receive your comments and, if they are of interest to other readers, publish them. Letters will only be considered for publication if they include your name and address, although we can withhold such details from publishing on request. Note that we reserve the right to (and probably will) edit all letters for the sake of brevity, clarity or accuracy.

SUBSCRIPTIONS

Standard 12-issue rate within Australia: $32. Surface rate for New Zealand and Papua New Guinea: $48.40; airmail rate: $53.60. Rates for other countries on application. All overseas rates quoted are to be paid in Australian dollars. Allow up to eight weeks for subscription processing.

BACK COPIES

Back copies and single issues are available from the publisher's office ($2.95) or by mail ($3.95). We will supply photostat copies of articles where a back issue is not available, at the single-magazine price for each feature copied.

READERS' ENQUIRIES

We will make every effort to answer readers' written enquiries, if accompanied by a stamped, self-addressed envelope, although staff shortages and deadline pressures may cause delays. Please include your telephone number(s) with any enquiry. Phone enquiries not related to subscriptions, readers' advertisements, or other 'service information' cannot be accepted.

COPYRIGHT

LIABILITY

EDITORIAL CONTRIBUTIONS

Contributions to *Your Computer* are welcomed and will be given every consideration*. Please read these notes carefully to get an idea of the style and format we prefer.

All Contributions: should include your name, address, and home and office phone numbers (in case we need to check details). Each page of your submission, and any material sent with it, should also carry your name.

Contributions by Telephone: Contributors who have modems and suitable software (in the MODEM7/YAM mould — see our stories on Christensen Protocols in the May and June 1983 issues) can arrange direct transfer to our computers through our Bulletin Board system, which is on-line 24 hours a day, seven days a week. Contact our office by phone for details on transferring material in this way.

Contributions on Disk: Contributions can be accepted in most disk formats, although some have to be converted outside our offices, which will add to the (often lengthy) delay between receipt and acknowledgement. The preferred medium is IBM standard format single-sided, single-density, 20 cm CP/M disks or IBM PC-DOS minifloppies. We can also handle, in-office, most soft-sectored 13 cm disks, thanks to PC-Alien — so unless you have a particularly strange format, send it on disk straight from your machine. Please pack them extremely carefully if posting and label all disks with your name, address and phone number.

Listings: Unless it is absolutely impossible, we want listings produced on the computer. This reduces the risk of error - if the computer typed it, the computer probably accepted it. Print listings with a dark — preferably new — ribbon on white paper, and try to format the output to a narrow (40-characters) width. If they can't be produced on a printer, borrow a good typewriter — hand-written material is likely to sit around the office for a year before someone can find time to type it all out for you! Please provide an account of what the program does, how it works and so on. Any comments on the program should refer to the address, line number or label rather than to a page number. Any comments on modifying the program to work on other machines will be appreciated. Try to include a printout of at least part of a sample run if possible.

Style: All items should be typed (or printed) and double-spaced on plain white paper. We will only accept original copies - no photostats. Include your name, address, telephone number and the date on the first page of your manuscript (all manuscript pages should have your surname and page number in the top right-hand corner). Be clear and concise, and keep jargon and adjectives to a minimum.

*Although the greatest care will be exercised with contributions, no responsibility can be accepted for the safety or return of any letters, manuscripts, photographs or other materials supplied to *Your Computer* magazine. If return is desired, you should include a stamped, self-addressed envelope. If return is critical — say it's something you can't afford to lose — then don't send it; we *are* careful, but we're not perfect. □

market directory

DEALERS, distributors, mail-order houses and other commercial organisations or individuals who have a message to spread can take advantage of our Market Directory — small ads to help those searching for outlets, services and equipment. For details contact Your Computer on (02) 663-9999 or write to PO Box 21, Waterloo 2017.
For 1/12 DISPLAY ADVERTS in the Market Directory (50mm deep x 60mm wide) costs are **$125 per insertion.** Closing date 4 weeks prior to publication date. Supply finished artwork — or copy to Set & Makeup (at $40 extra to insertion cost). Payment strictly with copy. Call (02) 663-9999 for your booking NOW.

IBM SOFTWARE EVALUATION

Join the DOWN UNDER SOFTWARE library and take advantage of our unique software evaluation service. Your yearly subscription of $50 enables you to buy any of the most popular IBM-PC software programs, at our discounted prices of 20% to 50% off manufacturers' RECOMMENDED RETAIL PRICE. If the software doesn't meet your needs, return it within 7 days for a refund of your purchase price less a "RESTOCKING FEE" of 10% of the manufacturers' list price. (Minimum restocking fee of $15)

At DOWN UNDER SOFTWARE there are no High Pressure salesmen telling you what software you need, YOU DECIDE if it is suitable for your purposes.

HERE ARE JUST SOME OF THE PRODUCTS WE HAVE AVAILABLE FOR YOUR EVALUATION.

NAME	RETAIL PRICE	DISCOUNT PRICE	RESTOCK FEE
Dbase 3	$976	$750	$ 98
Macro Assembler	$161	$130	$ 16
Norton Utilities	$140	$100	$ 15
Savvy	$575	$495	$ 58
Wordstar Pro 3.31	$645	$420	$ 65
Wordstar 2000+	$795	$495	$ 80
Flight Simulator 2	$100	$ 70	$ 15
Jet	$100	$ 75	$ 15
Kings Quest	$ 70	$ 50	$ 15
Sargon 3	$ 75	$ 55	$ 15

For a full catalog, or more information, write or call us on (03) 429 3216

DOWN UNDER SOFTWARE

1 Botherambo St., Richmond, Vic. 3121

We don't SELL you software, we help you come to the right decision!

$7.00 INCLUDING DISK

Over 3,000+ software titles for your APPLE][,][+,][e,][c & compatibles, IBM-PC, PCjr, XT, AT & compatibles, APPLE MACINTOSH and IBM-JX. Lots of hi-quality manuals.

ALSO HARDWARE/ACCESSORIES

- Apple Graphic Mouse $50
- Extended 80 column card w/64K RAM $80
- CP/M Card $40
- IBM Light Pen $85
- LOTS OF BARGAINS

Specify your computer system together with $1 to cover air-mail postage for our fantastic catalog to:—

MICRO-WORLD, Dept YC
Towner P.O. Box 310
Singapore 9132
Republic Of Singapore

POOR PERSON SOFTWARE FOR CP/M 2.2 COMPUTERS

WRITE-HAND-MAN — Your magic menu appears with its option list — to save notes, check a 'phone list, update a diary, scan disk directories or text files and perform calculations in both decimal and HEX. No need to exit from wordprocessor, data base, spread sheet or other programs! Use with Ram disks, keyboard extenders and ZCPR. Supplied in both screen- and non-screen-refresh versions. Source code for option programs included! **$45**

MAILING LABEL PROCESSOR $40, Crossword game $26, Window system 35, Spelling Checker $26, Spooler $40, Menus $38, Keyed sequential files $38, Spread sheet $40.

ALSO AVAILABLE — MITEK Relocatable Z-80 Assembler to produce your OWN Write-Hand-Man Options! **$67.50**

Write for descriptive catalogue. Prices include pack and post.

In Popular Formats, e.g. Kaypro II, Osborne DD, Xerox 820, Apple II CP/M, 8" SSSD, Microbee 3½" and 5¼". Send pre-formatted disks for Televideo 802/803, Toshiba T100.

Order by Credit Card: Please charge my Bankcard ( ) Mastercard ( ).

Card No. ..... Exp. Date .....

Signature .....

GLYPHIC SOFTWARE
PO Box 391, Pennant Hills 2120

TYPESETTING BY TELEPHONE

Copy via modem, (at 300, 1200, or 2400 baud) disk or fax
Disks converted to typeset copy Cheaper, faster, error free

Frontier Technology Pty Ltd
(Formerly Hughes Phototype)

960 2788

66 Spit Rd, Spit Junction, NSW 2088

MUSIC SOUND RECORDING STAGE LIGHTING

SONICS MAGAZINE

For: Musicians, Road Crews, Recording Engineers, Lighting People, Managers, Promoters and anybody interested in what goes into today's music-making.

THE ALL AUSTRALIAN MUSIC MAKERS' MAGAZINE

"No longer the best kept secret in computer software"

THE Benchmark®

INTEGRATED OFFICE AUTOMATION SOFTWARE

The standard by which all others are measured

	RRP
1. Administrator	$150
2. Word Processing	$295
3. Spelling Checker	$150
4. Data Manager	$275
5. Mail List Manager	$150
6. 3D Spreadsheet	$275
7. Graphics	$275
8. Notebook & Messages	$150
9. Executive Pack Ø(1,2,3,5)	$395
10. Executive Pack 1 (1,2,3,4)	$475
11. Executive Pack 3 (6,7,10)	$795
12. Executive Pack 4 (1-8)	$895
13. Composer Pack A (1,2,3,7)	$475

- MS-DOS/PC-DOS version for most 16 bit computers.
- Network, educational and site licences available.

Contact your dealer or

Sleebs Computer Industries
163 Eastern Road, South Melbourne, 3205
Phone (03) 690 1333

***Special Introductory Offer**
Administrator $10 if you forward a cheque and copy of this advertisement.

COMPUTER TACKS

Sssshhhh! Not so loud. We're in hiding. Yes, you too. Bet your tax shelter isn't as cosy as our bunker; for one thing, we've got all the magnums that Andrea didn't have time to pop as we made our escape. And the tax man is probably more formidable than the ESN tracker forklifts that we've heard are poking around, high and low, for us all over Sydney. We think we made it. It was spectacular . . . but ssshhh, more of that later. First we're going to help you out.

Do you feel like a sort of monetary taxidermist, always trying to preserve your funds and then stuffing it around June each year? You're sure you could organise it more efficiently and give the government less if you only knew how? Well, are you making the best use of your ally, your friendly, scrupulous, totally dependable, honest, capable, deceptive desktop computer? See, it winked!

In the taxing month of June we'll be looking at how your computer can help keep track of expenditure and prepare your tax return, maximising the amount of money you can (legally) claim from the department (keep smiling stupidly, they probably have you under surveillance right now).

And have you ever thought of your computer as a tax deductible item? Well, it's dependent on you for disks and printer ribbons, isn't it? And you're dependent on it to do your job, aren't you? We'll be investigating the tax department's views on this.

The tax Dodge has always been an unreliable vehicle, but that doesn't mean you can't Audi Fox them once in a while.

SCAPE SEEN

So, here we are, holding the Federal Brigade at bay on neutral ground. Unfortunately, *Your Computer* did suffer a few casualties on it's way through the barbed wire. As predicted, the guardener, the nightingale on reception and the management were totally bemused by our escape methods.

At precisely one second past five (there's a curfew on cork-popping before that hour), John Hepworth started digging furiously in the flower beds of the Sydney County Council next door, while a masked friend, alias Hurry Whodidit (reception had unwittingly issued him with a visitor's badge) burst out of one of the side doors and began snipping frantically at the wire fence using Matt's soldering pliers. "That's Incredible" came the shout from the rest of the Federal staff whose noses were making white podge-marks against the windows. We hung back for a while, sipping courage, and preparing the Canon (we were going to use a blunderbuss, I know, but it had been discovered and confiscated the week before).

Once Whodidit had snippled a hole about 45 cm in diameter, he Hurried back, we loaded him into the Canon, surrounded him with dot commands and pressed 'P'. For once the thing didn't jam, and Hurry shot out, left justified, ragged right and slightly off-centre towards the fence. It was the off-centre that did it. He missed the hole he'd prepared, tore an even larger hole somewhat to the left, and landed, looking like a hot-cross bun, on the other side. With a fearsome whoop we charged bravely down the driveway and out through the open gates (Hurry was what they call a publicity stunt) in a hail of various missiles.

Some time before we reached the safety of the Mattmobile, Damien and Craig shot one another in the foot, which meant they could stay at Federal; Felicity passed out due to inhalation of the Brut 33 she'd been brandishing; and Andrea, always a little tiddly, tottered into the wilds of Waterloo, saying in a befuddled tone that she had something to follow up.

. . . So we (Matt and Natalie) fastened our seat belts, shouted XYZZY and were gone. We had to come back the next day for the computers. Fancy going to all that trouble just to change addresses (send all postcards, Pocket Programs, suggestive letters, press releases and so on, to *Your Computer*'s new offices at Suite 6, 161 Military Road, Neutral Bay 2089). The island still looms in our fantasies — we figure we're about one-tenth the way there.

As you might have noticed in this issue, Les failed to come to our assistance with a review of Javelin, nor did he unravel Paradox. He had, we discovered, fled to London, where he skulked until the heat was off . . . but we outsmarted him by occupying his premises (at the aforementioned address), where we've sworn we'll stay until he starts delivering his articles on time.

Software Corporation of Australia also failed to deliver Pagemaker, and Natalie was too busy freezing custard puffs, in preparation for the long journey across the harbour, to harangue the company effectively. One of our new-technology printers got stuck in customs, so the fifth shootout was shot. We're all fired up to run it next issue. What with that and the missing fifth games machine, it's lucky we shot one of your fingers off last month. The Amiga? Well, we did say it was a maybe, but now it's a definite for June (Tim Hartnell was rapt).

Tim has also completed an adventure shell — hold the listing to your ear and you'll hear the distant hacking of dwarf axes, the hiss of serpents, the clink of treasure — around which you can base a game of your own intrepid imagining.

June will also yield reviews of the Wang APC and Xtree (a hard disk manager), a swag of Instruction Set from our tutorial team and the second half of our BASIC for Birdwatchers compilation. Stax of reading to help quell your tax attax.

If you think you've got problems, spare a thought (a short, businesslike thought) for *Today's Computers*, a magazine which recently faded into yesterday.

July will be an explosion, graphically speaking, of course, of colour and high res and even higher res. Why the fireworks? *Your Computer* turns five in July, and you'll be starting a new, more rewarding (read 'richer') financial year. Leaving the tax lurks behind, you'll find you can have much more fun with graph-it and colour eruption. Don't be left behind in the race for a better computer image.

P.S. The driveway on Federal's side of the fence is made of concrete, so John Hepworth's valiant attempt remained IBM Underground. □

The new Sony Model 10 word processor.

You'll be so efficient you may need to find another use for your in-tray.

Don't let the cute looks and small size deceive you. This innocent-looking machine has a huge appetite for work!

The Model 10 with Sony's own word processing software is so easy to operate, it makes personal computers look like old manual typewriters.

The keyboard, screen and physical shape are a refreshing break from the bulky traditional computer style.

Those tough little 3½" disks will reliably store up to 250 pages each! And our user manual is understandable! Even by non-technical people!

To help you see your extra profits, the Model 10 will run Multiplan™ or SuperCalc.™ And to keep track of all your extra customers and new business, the Model 10 will run dBase II.™*

You can also use it as a terminal to access mainframes, remote databases and electronic mail.

Now, instead of fumbling for words on a personal computer, you can enjoy the full ease, power and efficiency of a real word processor. Personal computers are now obsolete when it comes to word processing.

And you'll welcome the friendly personal service and support you'll enjoy as a proud Sony user.

Current owners call it their "faithful little friend".

Call us now about the Model 10. It could be the start of a special relationship. And it could be the end of your overloaded in-tray.

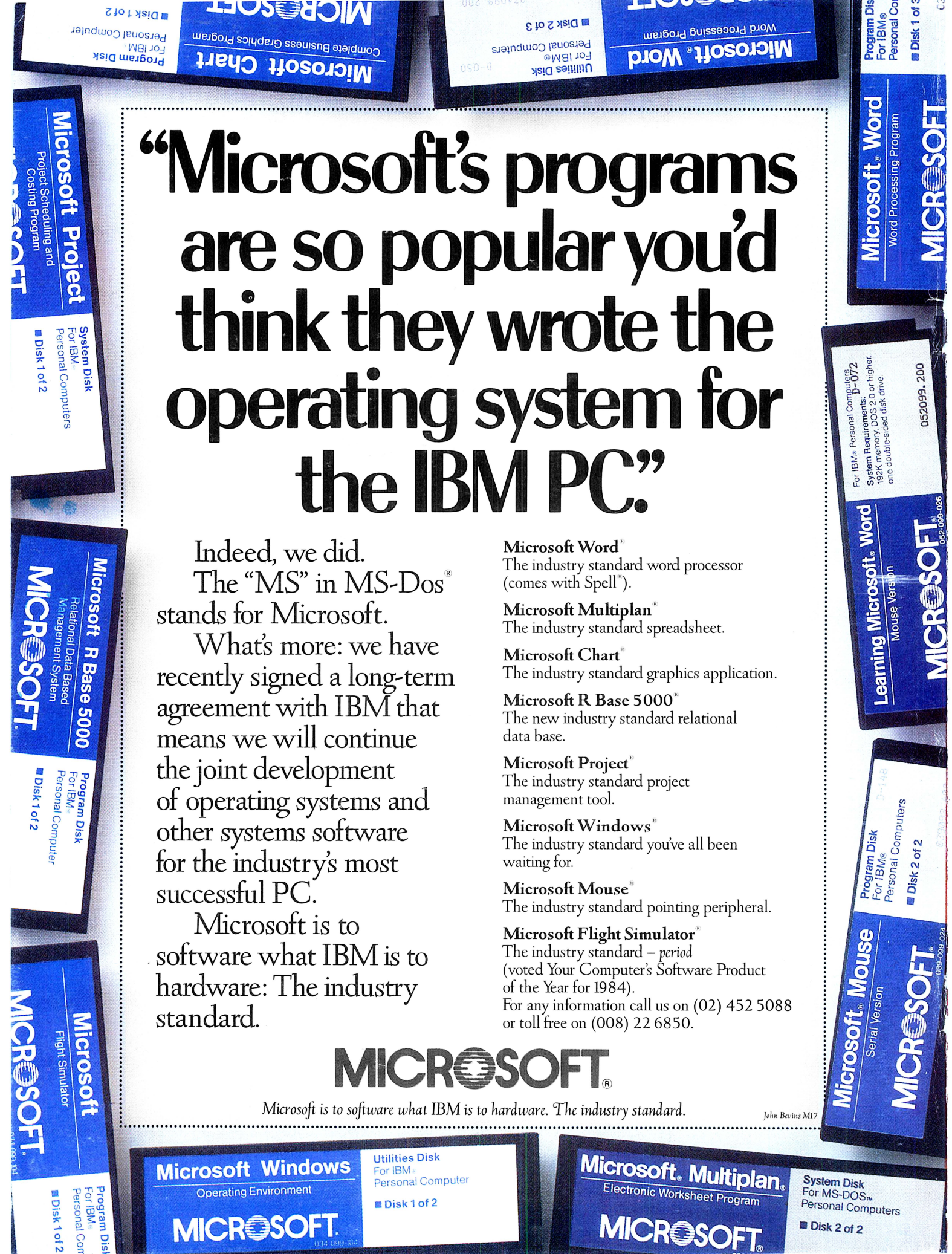
*Multiplan is a trademark of Microsoft Corporation. SuperCalc is a trademark of Sorcim Corporation. dBase II is a trademark of Ashton Tate.

SONY®

Office Automation

Sydney (02) 887 6666 Melbourne (03) 836 4011 Canberra (062) 80 5576 Brisbane (07) 44 6554 Adelaide (08) 212 2877 Tasmania (003) 43 1034

SOC 3635



"Microsoft's programs are so popular you'd think they wrote the operating system for the IBM PC."

Indeed, we did.

The "MS" in MS-Dos® stands for Microsoft.

What's more: we have recently signed a long-term agreement with IBM that means we will continue the joint development of operating systems and other systems software for the industry's most successful PC.

Microsoft is to software what IBM is to hardware: The industry standard.

Microsoft Word®
The industry standard word processor (comes with Spell®).

Microsoft Multiplan®
The industry standard spreadsheet.

Microsoft Chart®
The industry standard graphics application.

Microsoft R Base 5000®
The new industry standard relational data base.

Microsoft Project®
The industry standard project management tool.

Microsoft Windows®
The industry standard you've all been waiting for.

Microsoft Mouse®
The industry standard pointing peripheral.

Microsoft Flight Simulator®
The industry standard – *period*
(voted Your Computer's Software Product of the Year for 1984).

For any information call us on (02) 452 5088 or toll free on (008) 22 6850.

MICROSOFT®

Microsoft is to software what IBM is to hardware. The industry standard.

John Bevins MI7